Hathaway

IDM T2

User Manual

40-8435-04

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Introduction

IDM Overview

About this Manual

This manual assumes no previous knowledge of operation of this type of test equipment. Although details are given on the manner in which the IDM should be used, reference should also be made to the Help menu within *Replay™ Plus* software for further instructions.

Introduction (This Section)

First time users of the IDM should read this section which describes the capabilities of the system and the operational overview to understand how the IDM functions.

Installation

Gives information on IDM installation with details of the various inputs and outputs.

Replay™ Plus

Describes how to configure IDM parameters using the Qualitrol Hathaway *Replay™ Plus* software package.

Note:
Some *Replay™ Plus* and IDMCal software screens and dialog boxes shown in this manual may have updated due to continuous product enhancement.

Where to Go for Further Help

If problems are experienced with the setup or the use of the IDM Data Acquisition System, please contact:

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15 Wildflower Way, Belfast, BT12 6TA, Northern Ireland
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Fax: +44 28 9022 5225

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Telephone: +1 303 799 8200
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e-mail: sales@hathaway-systems.com
Internet: www.qualitrolcorp.com

What is an IDM?

The IDM is an advanced multifunction distributed data acquisition system designed to address the data recording requirements of a modern transmission or distribution power substation. The product, when coupled with the Qualitrol Hathaway *Replay™ Plus* software package, provides a powerful platform for the acquisition, analysis and reporting of data from power system substations.

The IDM Data Acquisition Unit (DAU) has six standard formats (or types):

- A 3U rack mounting model, the **IDM T1** (Type 1)
- The **IDM T2** (Type 2), an upgrade kit for Qualitrol Hathaway DFR 0, DFR I, DFR II and DFR II (B) fault recorders giving them the functions of the IDM T3
- A 6U rack mounting model, the **IDM T3** (Type 3)
- A portable model, the **IDM T4** (Type 4), which is based on the 3U IDM T1
- A 6U rack mounting model, the **IDM T5** (Type 5)
- A portable model, the **IDM T6** (Type 6), which is based on the 6U IDM T3

IDM T1

The IDM T1 DAU

The IDM T1 DAU is equipped with 10 analog channels and 16 or 32 event channels, in a 3U 19" rack mountable enclosure that is 312mm deep.

IDM T2

Upgraded IDM T2 DAU

The IDM T2 DAU is a powerful, cost effective upgrade that extends the life of existing DFRs providing all the functions of the IDM, including GPS time synchronization, higher scan rates and software sensors. The upgrade retains the signal conditioning of the original DFR allowing an upgrade to be performed without requiring any modification to protection wiring.

IDM T3

The IDM T3 DAU

The IDM T3 DAU is equipped with 16 analog channels and 32 event channels, in a 6U 19” rack mountable enclosure that is 326mm deep.

IDM T4

The IDM T4 DAU is an IDM T1 DAU enclosed in a carrying case for portable use.

The IDM T4 DAU

Access to the 10 analog and 16 event channels is via 4mm safety connectors accessible at the rear of the case. External VT boxes and CT clamps are used for monitoring feeder circuits. These isolated signals are then fed to the 10 analog channels of the IDM DAU.

IDM T5

The IDM T5 DAU

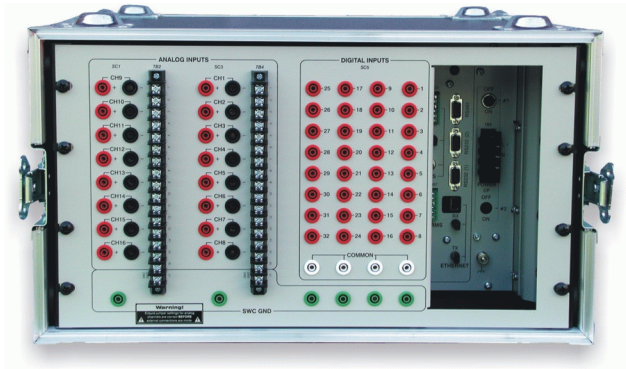
The IDM T5 DAU is equipped with two IDM T3s in a 6U 19” rack mountable enclosure that is 326mm deep. Each has 16 analog and 32 event channels independent of each other.

IDM T6

The IDM T6 DAU is an IDM T3 DAU enclosed in a carrying case for portable use.

The IDM T6 DAU

Access to the 16 analog and 32 event channels is via 4mm safety connectors accessible at the rear of the case.



IDM T6 DAU Rear

All IDM DAU types are equipped with fully internal signal conditioning making them very compact units and suitable for mounting in the relay panel of the feeder or item of equipment being monitored. They can be equipped with an optional internal GPS decoder or synchronized by an external time source (e.g. IRIG B).

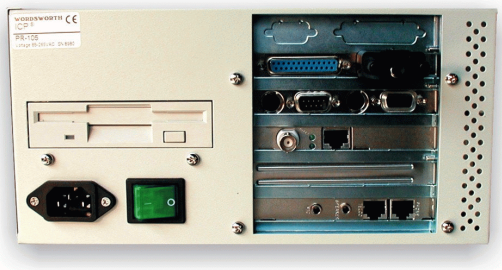
The DAU Channel Configuration Sheet provided with each recorder gives full details of the analog and event channel configuration and the supply voltage for each recorder. Sample forms for each recorder type are included in **Appendix A.**

LSU (Local Storage Unit)

The LSU is a industrial PC based device that provides the following functions in an IDM installation:

- Non-volatile storage for DFR, TSS and CSS records
- Modem sharing between multiple DAUs
- Printing records from multiple DAUs

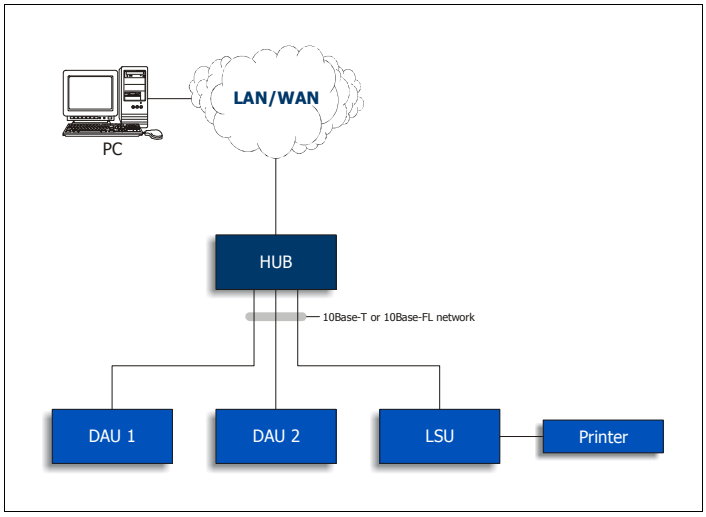
The LSU is equipped with two serial ports, an internal 56K modem, a minimum 20Gbyte hard drive and a network interface card equipped with a 10 base T and AUI port. It runs the multi-tasking **Linux** operating system.



The LSU (Local Storage Unit)

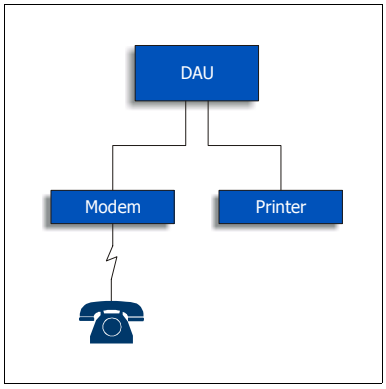
IDM Installation Configurations

In those installations where more than one IDM DAU is installed at a given location then they communicate with each other using twisted pair or fibre-optic Ethernet. To interconnect devices using Ethernet a hub is required and some sample network topologies are shown below. Twisted pair Ethernet communications , also known as 10Base-T, has a maximum range of 100m (300 feet) under normal conditions however care should be taken in substation installations to avoid induced transients from other conductors. For this reason it is not normally recommended to extend twisted pair Ethernet cables beyond an adjacent cubicle in a substation environment. Fibre-optic Ethernet networks, also known as 10Base-FL, can be extended to over 1 kilometre while using multi-mode fibre.



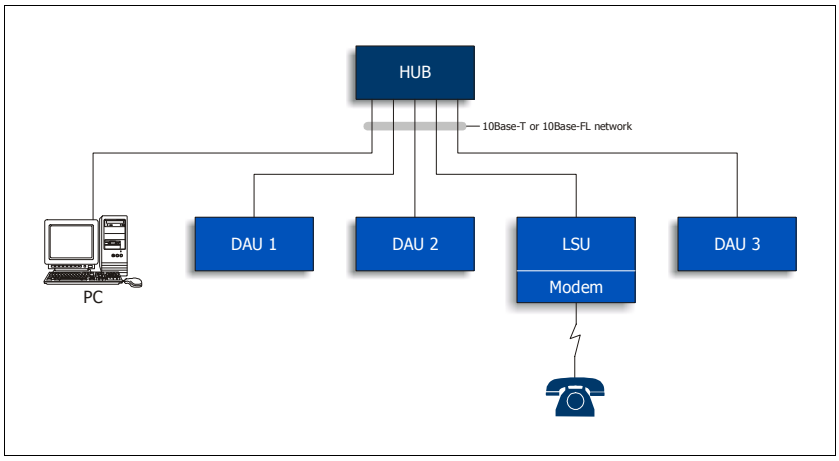
Networked IDM Installation with Connection to a WAN

The above figure shows a networked IDM installation with a connection to a Wide Area Network where data can be automatically transferred to a remote PC on the network.



Single DAU Installation

This figure shows a single DAU installation with modem communications and local printer.



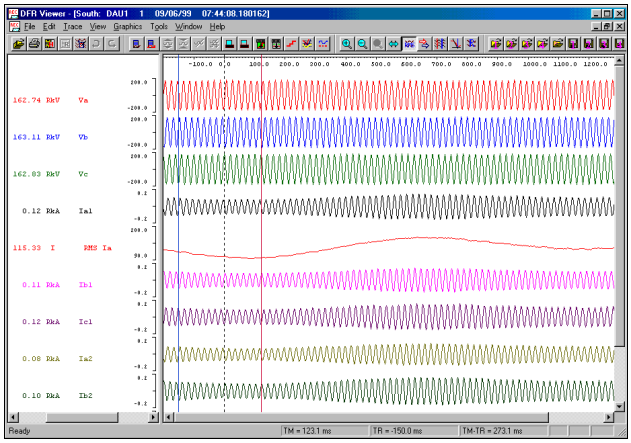
Networked IDM Installation

The above figure shows a networked IDM installation with a local PC, and LSU for mass storage, local printing and remote communications.

IDM Functions

DFR Fault Recording Function

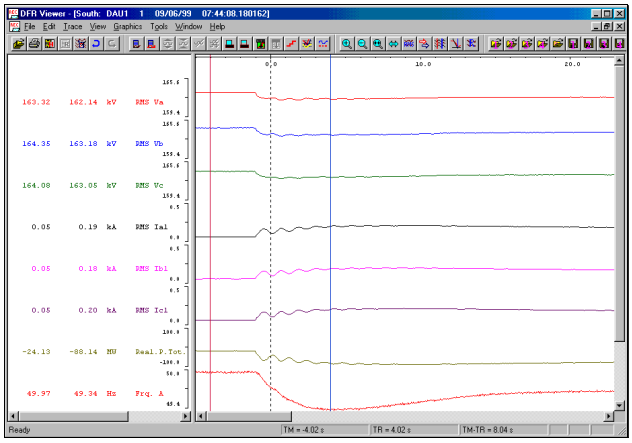
High speed recording, monitoring the transient response of the power system and equipment during and just after a system fault or transient disturbance.



Fault Recording Function

TSS Triggered Slow Scan Function

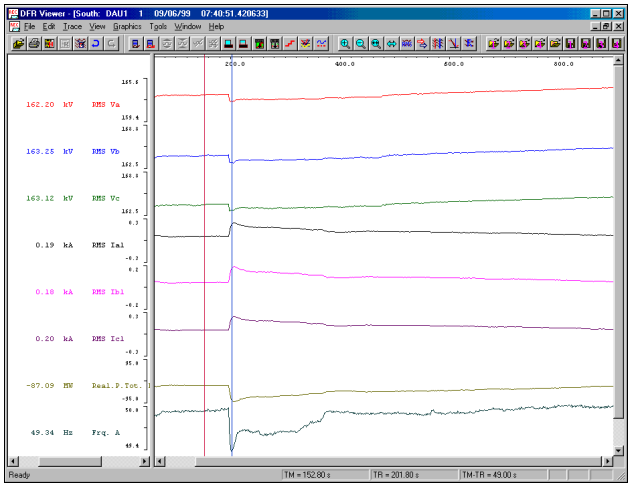
Slow speed recording monitoring specified calculated power quantities for up to 30 minutes before, during and after a transient fault or disturbance at scan rates up to once per cycle. Calculated quantities available include rms voltage and current, real and reactive power, sequence components and frequency.



Triggered Slow Scan Function

CSS Continuous Slow Scan Function

A slow scan function providing recorded calculated quantities for up to 15 days for long term power stability monitoring. This function requires a Local Storage Unit (LSU), an industrial PC based storage device with a hard disk drive providing the long term data storage facility. Quantities available for recording are the same as those available for TSS recording.



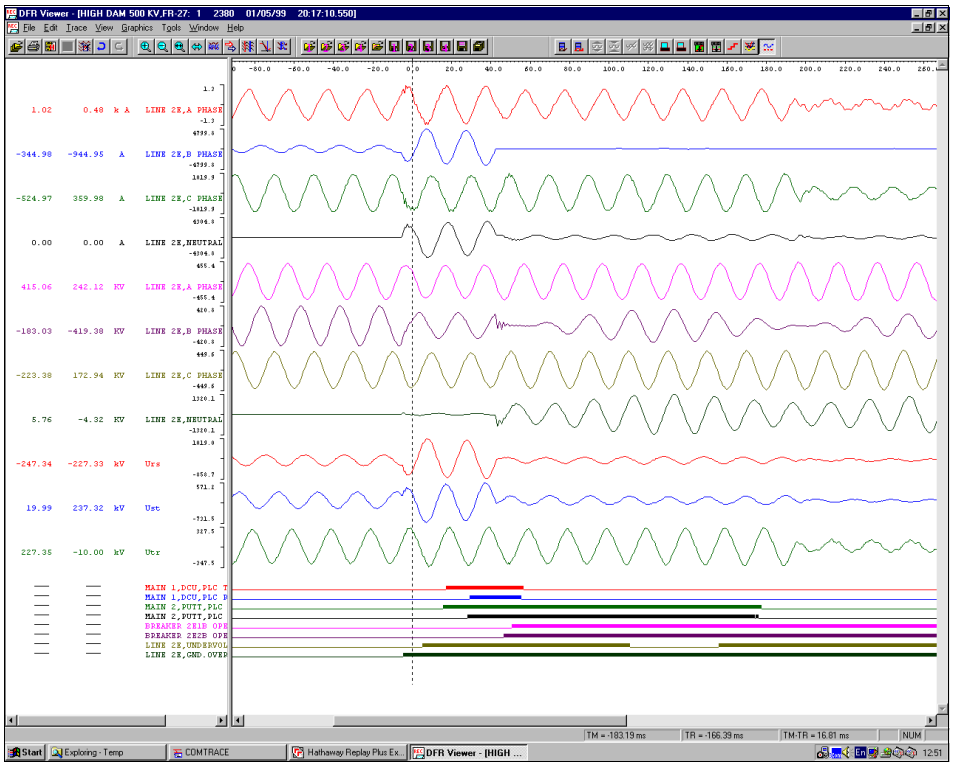
Continuous Slow Scan Function

Replay™ Plus Overview

About Replay™ Plus

The Replay™ Plus Master Station suite of software applications provides configuration, communication, data analysis and management for a range of Qualitrol Hathaway Products.

Replay™ Plus will run on Windows 9X / Me / NT 4.0 / 2000 / XP.



Replay™ Plus **Master Station Software**

When used with the IDM it provides the following functions.

- Communications via direct connection, modem, or twisted pair or fibre-optic Ethernet network
- Local or remote configuration of IDM DAUs
- Data retrieval from IDMs
- Data analysis, presentation and management

A user interface similar to Windows Explorer is used to display lists of records and installed devices and a “drag and drop” interface is used for IDM configuration. All device configuration information, lists of records and record summary results are stored in a **Microsoft Access** database to provide open access to the data however Microsoft Access is not required to run Replay™ Plus.

Installation

Installation Overview

DFR Upgrade Information

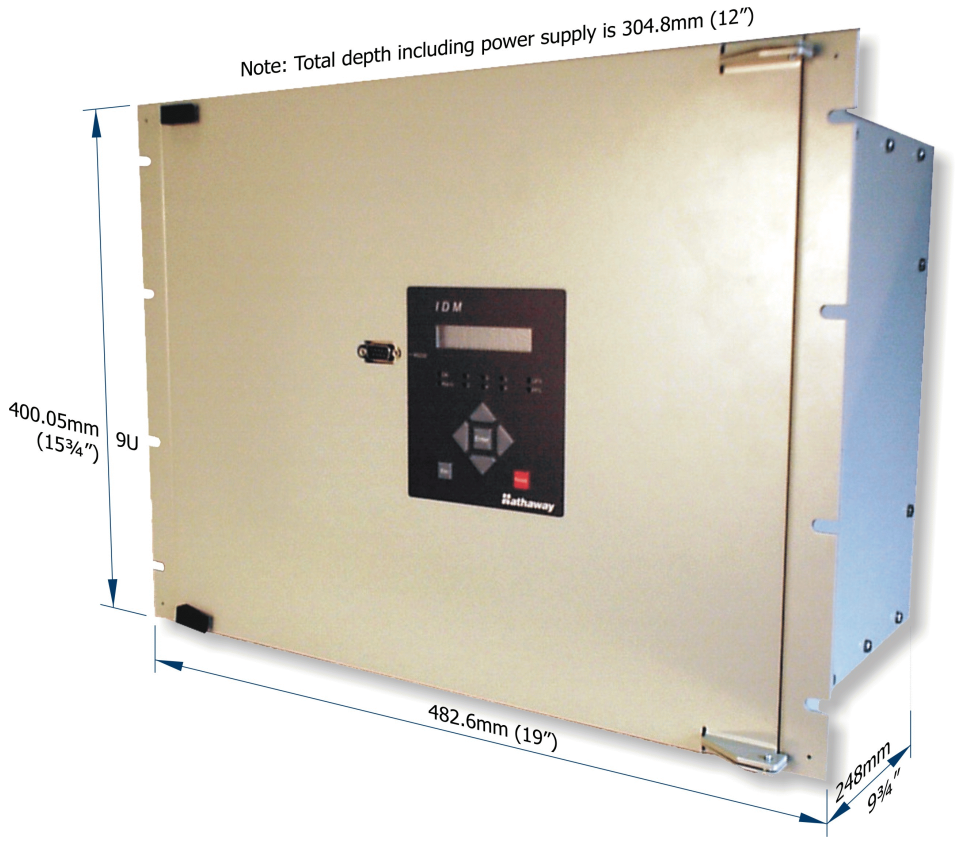
The information given in this section relates specifically to a DFR II (B) Fault Recorder which has been upgraded to an IDM T2 DAU.

Note:
For information on how to upgrade an existing DFR 0, I, II and IIB chassis using the IDM 16/32 DFR upgrade kit, please refer to the "DFR Upgrade Installation Manual" available from Hathaway (document number 37-8275).

User Connections

System Layout

A dimensioned picture of the 9U rack mounting IDM T2 DFR II (B) DAU is shown below. It is an easy device to mount. All analog, event and alarm signal conditioning is internal to the chassis. All input signal connections to the device are via screw terminal blocks on the rear panel. The IDM is small enough to mount directly into the protection panel of the equipment being monitored.



IDM T2 DFR II (B) DAU Dimensions

Input / Output Connections

See **IDM T2 DFR II (B) DAU Rear** picture, next page.

Power Supply and Earthing

The standard DAU power supply is a universal input with the following ranges:

- 85V to 320Vdc
- 90V to 250Vac, 50/60Hz

The burden of the DAU is **40VA**.

The power is connected to the PSU 10-way terminal block labelled **Input**. The labels **AC** and **AC** are for live and neutral of an AC supply. The labels + and – show the polarity of the DC supply.

It is very important to connect a ground to the **CHASS GND.** screw. This connection is the chassis ground of the instrument.

Analog Inputs

The DAU has 16 analog inputs in increments of four connected via **TB6** and **TB7**.

Analog inputs can be AC voltage via interposing transformers, AC current via 120mΩ or 600mΩ shunts or DC voltage via DC isolation amplifiers.

The **IN** and **RTN** labels on the rear panel show the connection of each input to ensure correct phase relationship is maintained between the signals.

The DAU configuration sheet provided at the back of this manual will confirm the channel allocation.

IDM T2 DFR II (B) DAU Rear

All analog channels are calibrated in the factory and there is no need for site adjustments. The DAU configuration sheet provided at the back of this manual will list the calibration details of each analog channel.

Each analog channel is fully isolated from each other and from ground.

Caution!
It is important to connect the analog inputs **SWC GND** to the main ground of the system.

The following also applies:

- Accuracy of reading better than <1% of full scale

Where a DAU is supplied with a combination of current and voltage channels always ensure that the selected input channel is a current channel before connecting a CT circuit.

Event / Digital Inputs

Each DAU is fitted with up to 32 digital inputs in increments of eight. The digital input sensitivity can be 24V, 48V, 110/125V or 220/250Vdc with a tolerance of ±20%. The DAU configuration sheet gives the digital input details.

The purpose of the digital inputs is to monitor the state of external contacts normally associated with protection relays and plant.

The digital input connections are via the screw terminals on **TB2**, **3**, **4** or **5**. Event inputs are labelled **IN** and **COM** with each COM internally connected.

For a wet Event board, an external DC wetting voltage is required to operate the digital inputs directly. For a dry Event board, a voltage is required to operate the **+PP** and **–PP** inputs and a short applied to the digital inputs. This energising voltage is normally from the station battery.

A DC voltage (in the correct range) applied across an input is interpreted as a closed contact while the absence of voltage is interpreted as an open contact. The current drawn by each input, when rated voltage is applied is approximately 4mA.

The digital inputs are arranged in groups of eight with one common connection. The inputs are unipolar only.

Each group of eight digital inputs is isolated from each other and from ground.

Caution!
It is important to connect the digital inputs **SWC GND** to the main ground of the system.

Alarm Outputs

Each DAU is fitted with Alarm 1 and 2 on **TB1**. Each alarm is in the form of a dry contact rated as follows:

- 0.4A at 125Vdc

The alarm output connections are via screw terminal block **TB1**.

Fail Alarm is a normally closed contact that opens when the DAU is switched off of when a critical alarm occurs in the system.

Operation Alarm is a momentary contact which is closed for 250ms every time the DAU is triggered. This is equivalent to the **Fault Alarm** on DFR systems.

Ethernet Connections

There are two types of ethernet connection, a **10Base-T** and a **10Base-FL**. Both operate at a speed of 10Mbits/sec.

The 10Base-T connection is via the **RJ45** socket (**P15** on the CPU board) and is used for short range communication over standard twisted pair cables.

The 10Base-FL connection is via the two ST fibre connectors (**P13/14** on the CPU board) and is used for longer range communication over fibre optic cables.

These connections are at the front of the CPU board and run through the spare I/O card slot on the DAU rear.

The white coloured connector is for transmit and the grey colour for receive.

The connectors are suitable for 62.5/125 micron multi-mode fibre cable. The wavelength used is 1300nm.

The IDM uses TCP/IP protocol.

Ethernet Firmware Installation

Two versions of firmware exist for IDMs. A typical file name, where **x**, **y** and **z** are the firmware version numbers, would be as follows:

- vx080201_x-y-z.bin - For RJ45 twisted pair ethernet only
- vxAUI080201_x-y-z.bin - For fibre optic ethernet only

Unless otherwise stated, the shipping default firmware is of the **vx** type, which will only support RJ45 twisted pair networking.

If fibre optic network cabling is being used the **vxAUI** firmware needs to be uploaded to the DAU.

Firmware is updated using **IDMCal** software. Refer to Appendix H, IDM DAU Recovery, for more information on updating firmware.

As the network will not be active if the wrong firmware is installed, the uploading will have to be executed through direct connect or XModem.

The firmware is referred to as **Application** within IDMCal.

Serial Ports

The DAU has two serial ports, **#1** and **#2**. Port #1 is accessible on the front panel 9-way D type connector as well as the rear panel 25-way D type connector. Port #2 is accessible via the 25-way D type connector connected to **P16** on the CPU board.

The pin out for the **RS232 #1** and **#2** is given in the following table:

9-WAY D	
Pin 1	
Pin 2	RXD
Pin 3	TXD
Pin 4	DTR
Pin 5	GND
Pin 6	
Pin 7	RTS
Pin 8	
Pin 9	

25-WAY D	
Pin 1	
Pin 2	TXD
Pin 3	RXD
Pin 4	RTS
Pin 5	
Pin 6	
Pin 7	GND
Pin 20	DTR

A modem, PC or printer can be connected to the serial ports via standard serial cables.

Port #2 can be configured as an RS485 output via internal link selection. Set jumper **J6** to position **A** on the CPU board for RS485 and to position **B** for RS232.

When the DAU is equipped with an internal GPS time decoder or IRIG-B time decoder these devices use the **COM 2** port to interface to the processor and it is no longer available for external use.

Inside the front panel two jumpers, **J24** and **J25**, select whether the ports is available for external use or is configured for use by an internal time decoder. For both jumpers position **A** is selected for external use and position **B** is selected for an internal time decoder.

The pin out for the 10-way DIL header **RS485** connection (P17 on the CPU board) is given in the following table:

Pin 1	
Pin 2	
Pin 3	B
Pin 4	
Pin 5	A
Pin 6	
Pin 7	
Pin 8	
Pin 9	GND
Pin 10	

Clock Synchronisation

Each IDM DAU has an internal free running clock for time stamping recorded data. This clock can be synchronized to an external source via a 1 pulse per second (1pps) applied on one of two inputs:

These connections are at the front of the CPU board and run through the spare I/O board slot on the DAU rear.

- The ST fibre connector (**U500** on the CPU board)
- Pins 1 and 3 of **P19** on the CPU board (RS485 multidrop)

These connections are at the front of the CPU board and run through the spare I/O board slot on the DAU rear.

Master DAUs can be equipped with an internal GPS or IRIG-B time decoder. A BNC socket is provided for the connection of the GPS antenna or via the **IRIG** BNC for IRIG-B 003, DC level, or 1kHz modulated BCD/SB data format signal.

Note:
The DAU can be equipped with either a GPS decoder or an IRIG-B decoder.

The internal GPS module connects to **P21** on COM2 and jumpers **J24** and **J25** on the CPU board must be set to the **B** position.

For IRIG support via COM2, install **U50** and jumpers J205 and J206 should be fitted. Additionally, jumpers **J24** and **J25** on the CPU board must be set to the **B** position.

Where multiple DAUs are installed at one site, one DAU (the Time Master) can be used to synchronize other DAUs (time slaves) using a 1pps (one pulse per second) signal. In this way all DAUs are synchronized to the same time, +/- 10µs, even if there is no accurate external time source.

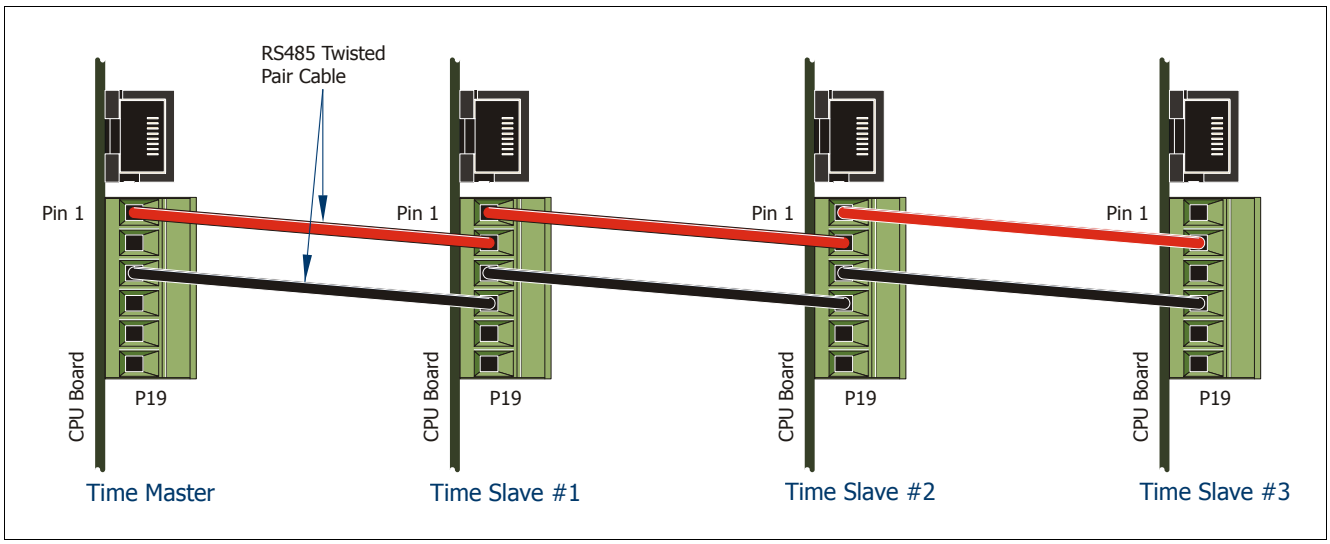
The following figure shows how DAUs are interconnected for 1pps synchronisation via RS485.

Note:
For DAUs with clock synchronisation using RS485 multidrop, the last Slave in the chain has jumper **J20a** on the CPU board inserted for correct RS485 termination.

The pin out for **P19** is given in the following table. The connections are via a screw terminal adapter block that plugs into P19 and runs through the spare I/O board slot on the DAU rear.

Pin 1	A (loop in)
Pin 2	A (loop out)
Pin 3	B (loop in)
Pin 4	B (loop out)

Pin 1 is located at the top of the connector.



DAU Interconnection for 1pps Synchronisation

LCD/Keypad Operation

Normal Operation

The LCD displays the following during run time operation:

Line 1

This displays the time and date <hh><mm><ss>
<dd><mm><yy>
The display is updated every second.
An underscore will appear between the time and date to indicate that time synchronisation cannot be guaranteed.

Line 2

This displays the DAU name.
To view the IP address of the DAU, from the keypad use key sequence:

<left arrow> <up arrow> <right arrow> <down arrow>

Then press <down arrow> again to toggle between the DAU name and the IP address.

Note - Exiting Menu Options:
All the following menu options can be accessed from the normal run time display.
Pressing <esc> at any time whilst in the menu option will return the DAU to the run time display.

Display Alarms?

To view the last eight alarms use the key sequence:

<Enter> <Enter>

The LCD will then display the following:

Line 1

Displays the alarm time and date <hh><mm><ss>
<dd><mm><yy>

Line 2

Displays the alarm message.

From the keypad use <left arrow> and/or <right arrow> to scroll along the alarm text.
Use <up arrow> <down arrow> to go through the available alarms.

At this stage pressing the <Reset> key will clear any LEDs associated with an alarm.

Manual Trigger?

To initiate a manual trigger use the key sequence:

<Enter> <down arrow> <Enter>

After a manual trigger has been sent the DAU will return to run time mode.

Test Relays?

To test the two status relays use the key sequence:

<Enter> <down arrow> <down arrow> <Enter>

Then <up arrow> or <down arrow> to select which relay.

Then <Enter> <up arrow> Relay closed, <down arrow> Relay open, <Enter> pulse.

Satellite Info?

To examine the satellite information use the key sequence:

<Enter> <down arrow> <down arrow> <down arrow> <Enter>

If the master DAU is configured for and locked to the GPS, then the number of satellites and length of time locked will be displayed.

If the master DAU is configured for but not locked to the GPS then the time satellite lock has been lost will be displayed.

If the master DAU does not receive the GPS time string then a error message to this effect will be displayed.

A Slave DAU displays the time elapsed in minutes since the last hourly time synchronisation packet was received from the master DAU.

Note:
On power up/reset the master DAU sends a series of time packets every minute for the first five minutes and then every hour to the slave DAUs.

Additionally, with the Satellite Info option displayed, pressing <Enter> again will give details on the antenna status.

The antenna status will be reported as passed, open or short. These antenna status messages are self explanatory, and the antenna status option is included to facilitate diagnosis of potential cable/antenna problems:

- passed - Antenna correctly detected
- OPEN - Open circuit in cable from GPS module to antenna
- SHORT - Short circuit in cable from GPS module to antenna

This antenna status information is available to be updated every minute, after receipt of the GPS time string from the GPS module (which is observed as a short flash of the GPS LED on the keypad).

Upon receipt of a GPS time packet, the antenna status displayed on the LCD of the DAU may be refreshed by pressing <Enter>

Note:
The Antenna Status option is not available for Slave DAUs or Master DAUs without GPS.

Examine IDs?

To examine the DAU node and network ID use the key sequence:

<Enter> <down arrow> <down arrow> <down arrow> <down arrow> <down arrow> <Enter>

This displays the current DAU node within the specified network.

Disable Triggers

To disable the triggers use the key sequence:

<Enter> <up arrow> <up arrow> <up arrow> <Enter>

The LCD will then display the following:
Esc to confirm
Enter to cancel

Use <Enter> to cancel disabling triggers.
Use <Esc> to display the following:
DISABLED 60min
Esc to re-enable

Use <up arrow> to increase disable time in 30min steps.
Use <down arrow> to decrease disable time in 30min steps.
Use <enter> to default to 60min disabling.
Use <Esc> to re-enable triggers.

Channel Check?

Channel Check Mode Overview

Channel check mode enables the DAU to display analog and event information on the LCD display to facilitate checking of user inputs. It can assist in commissioning or checking of user inputs to an DAU where a pc running *Replay™ Plus* is not available.

Using the integral keypad of an DAU the user may select an individual analog channel and its present, secondary value will be displayed on the LCD. This value will be updated approximately once per second.

Similarly, event state may be displayed. Groups of 16 events are displayed simultaneously on the LCD, where a '1' indicates current flow in the event channel and a '0' indicates no current flow in the event channel.

Channel check mode only allows display of analog and event channels that are physically available and connected to the IDM DAU. Quantities computed by the DAU (such as real and reactive power) are not available for selection by Channel Check Mode.

To access channel check mode use the key sequence:

<Enter> <up arrow> <up arrow> <up arrow> <up arrow> <up arrow> <Enter>

The LCD will then display the following:
Enter to confirm
Esc to cancel

Use <Enter> to start channel check mode in the last used mode, or in the analog check mode if the IDM DAU has been restarted since this option was last used.

There are two modes of operation, analog and event mode, to display analogue values and event states respectively.

Use <Esc> to terminate channel check mode.

Caution!
During channel check mode normal DAU functions are not available. Thus, the DAU will not trigger and record data as normal. There is no automatic timeout from channel check mode and an IDM DAU will remain in channel check mode indefinitely, until terminated by the user or the DAU is reset. SER 165 is issued when channel check mode begins and SER 166 when channel check mode ends.

Analog Channel Check Mode

The LCD will display 'Check Chan x' on the top line of the LCD where 'x' is the analogue channel number that is currently being viewed. The second line of the LCD will show the secondary value for that analog channel. The value is shown to 3 decimal places, followed by units (mV, V, mA, A, etc.) followed by a signal type identifier (AC or DC). For ac channels, the secondary value show is rms.

Use <up arrow> to increase or <down arrow> to decrease the analog channel number that is currently being viewed. Viewing will be automatically limited to the physical analog channels available in the DAU.

Use <left arrow> or <right arrow> to toggle the mode of operation into event channel check mode.

Use <Esc> to return to normal DAU operation.

Event Channel Check Mode

The LCD will display the word 'Events' in the centre of the top line confirming that channel check mode is selected for event information.

Top left on the LCD displays the event number for the event channel state that is displayed bottom left on the LCD. Similarly, top right on the LCD displays the event number for the event channel state that is displayed bottom right on the LCD. The events channel state on the bottom line are in numeric sequence from left to right.

The event state for 16 event channels is shown simultaneously as a series of '1's and '0's denoting the event state. Channel check mode does take into account the event channel normal/alarm configuration settings. Thus, a '1' indicates current flow in the event channel and a '0' indicates no current flow in the event channel. Setting the events as active high or active low in the IDM DAU configuration does not affect the state shown by event channel check mode.

If there are more than 16 events in the DAU use the <up arrow> to increase or the <down arrow> to decrease the event channels being viewed. Viewing will automatically be limited to the physical event channels available in the IDM DAU.

Use <left arrow> or <right arrow> to toggle the mode of operation into analog channel check mode.

Use <Esc> to return to normal DAU operation.

Version Numbers?

To view the current version of DAU firmware and DSP Cyclic Redundancy Checksum use the key sequence:

<Enter> <up arrow> <up arrow> <up arrow> <up arrow> <Enter>

This displays the firmware version and DSP CRC in 4 digit hexidecimal format.

In addition to the firmware version number, the letters **TP** or **AUI** will be shown.

- TP - Indicates the firmware is twisted pair and will use the RJ45 Ethernet connection
- AUI - Indicates the firmware will operate over the fibre optic Ethernet connection

Show Baud Rates?

To view the baud rate settings for the DAU COM1 and COM2 ports use the key sequence:

<Enter> <up arrow> <up arrow> <up arrow> <Enter>

The baud rates for COM1 and COM2 will be displayed.

Toggle IP / Name

This menu option enables the user to either display the DAU name or its IP address on the second line of the normal run time operation LCD display.

To display the IP address of the DAU use the key sequence:

<Enter> <up arrow> <up arrow> <Enter>

To return to displaying the DAU name use the key sequence:

<Enter> <up arrow> <up arrow> <Enter>

Erase NV Storage

To erase the non-volatile memory of a DAU use the key sequence:

<Enter> <up arrow> <Enter>

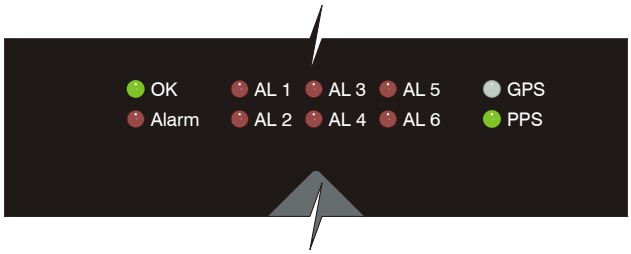
The LCD will then display the following:
Enter to confirm
Esc to cancel

If <Enter> is pressed, the display will then count through the NV memory blocks from 1 to 128 erasing them. During this process **AL 5** will remain lit.

Erasing the non-volatile RAM takes approximately two minutes. When the non-volatile RAM is completely erased, the IDM DAU will automatically return to normal operation.

LEDs - Normal Run Time Mode

IDM DAU LEDs



OK / GPS / PPS LEDs

The green LED marked **OK** should flash constantly indicating that the systems is healthy.

The green LED marked **PPS** flashes every second, this is to indicate pulse per second.

If there is a GPS installed in the DAU, the green LED marked **GPS** should flash once every minute to indicate an active string from the module.

Alarm LED

The red **Alarm** LED flashes to indicate an operational change has taken place. This could be due to one of the following example conditions:

- New application, configuration or DSP files being uploaded to the DAU
- The DAU being reset
- A trigger condition
- GPS lost lock

AL1 - AL6 LEDs

The red LEDs **AL1 - AL6** should not be lit during normal operation.

Caution!
If any of the AL1 - AL6 LEDs are lit this indicates an error and should be reported. Refer to Appendix H, IDM DAU Recovery, for more information.

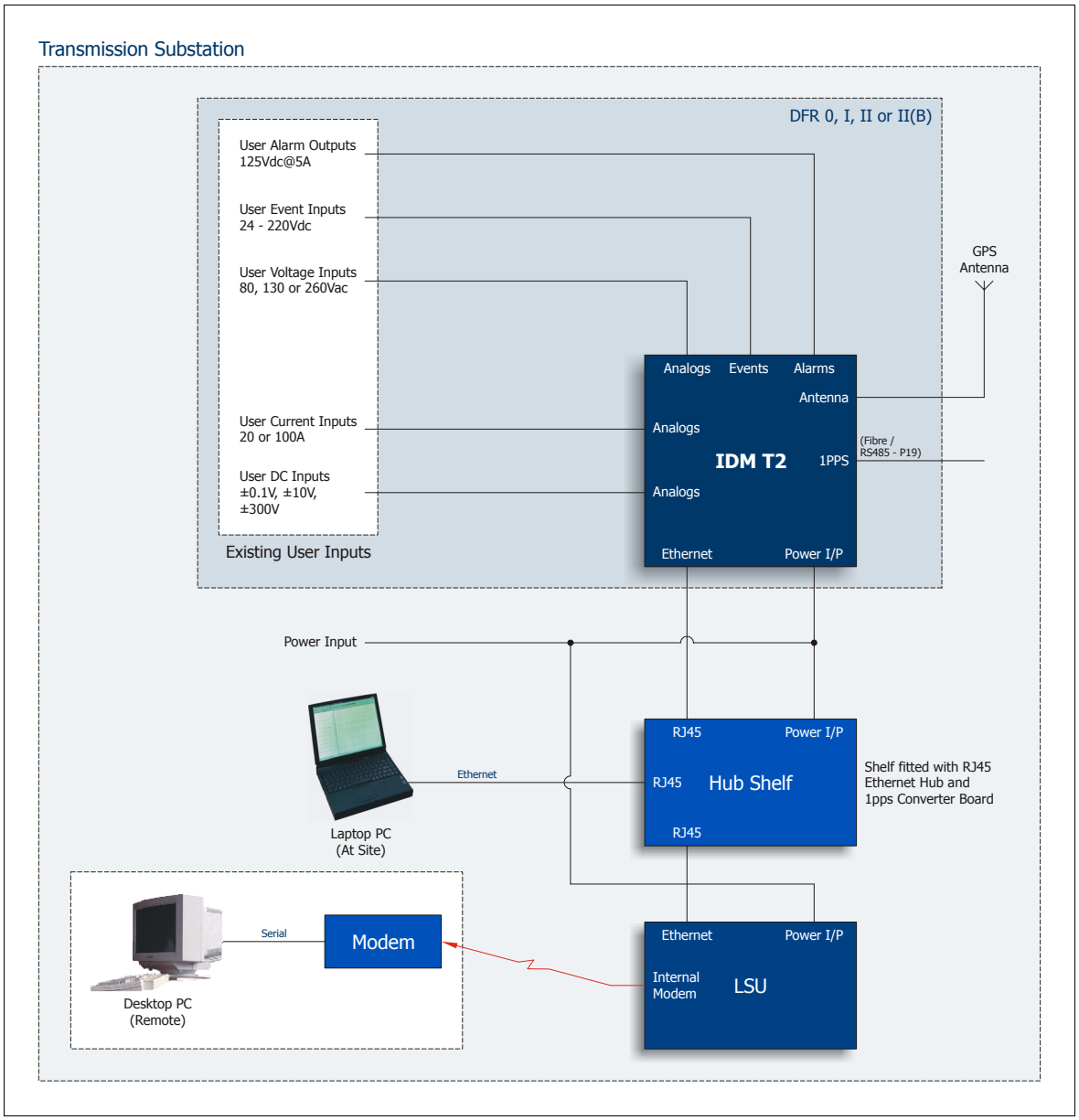
Connecting Peripherals

Peripheral Types

It is possible to connect peripheral devices to the RS232 port of any DAU. Access to other devices is via the Ethernet LAN. There are five types of peripheral device:

- LSU (Local Storage Unit)
- Hub shelf
- Modem
- Printer
- Local PC

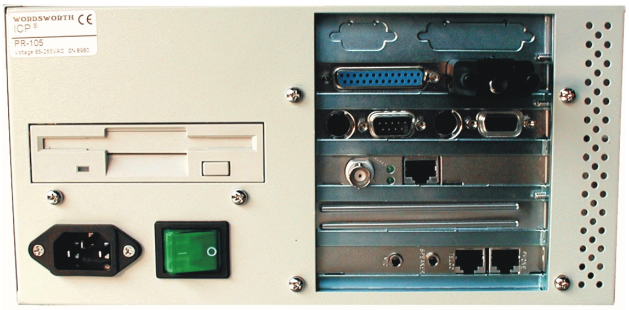
The block diagram is an IDM T2 installation showing connections to peripherals.



IDM T2 Installation

Peripherals - LSU

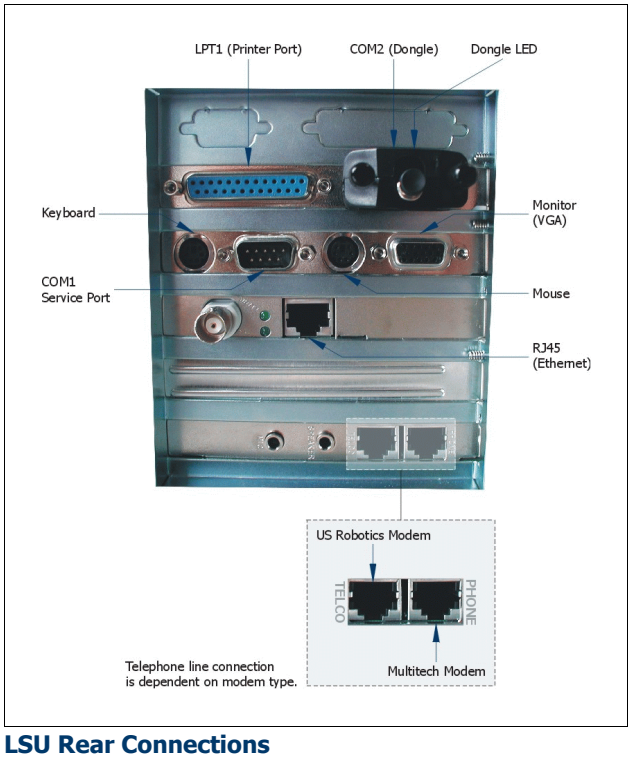
A rear view picture of the LSU is shown below.



LSU Rear

The LSU is equipped with the following:

- RJ45 Ethernet connection
- Integral modem
- LPT1 printer port
- COM1 serial port
- COM2 (dongle)



LSU Rear Connections

COM2 is used to indicate normal operation (via a flashing LED on the dongle) and to allow proper shutdown of the operating system. The LPT1 printer port enables printing of DFR and SER data.

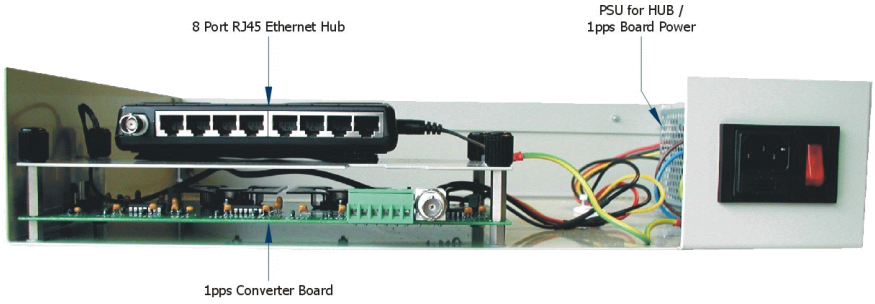
Peripherals - Hub Shelf

A rear view picture of the Hub shelf is shown below. It is used for Ethernet connections to a DAUs and LSUs.

The Hub shelf is equipped with the following:

- RJ45 Ethernet hub for LAN connections
- 1pps Converter board

The 1pps Converter board converts 1pps RS485, TTL or fibre inputs to up to eight fibre 1pps outputs. It also provides regulated DC power to the hub and integral modem (if fitted).



Hub Shelf Rear

1pps Converter Board

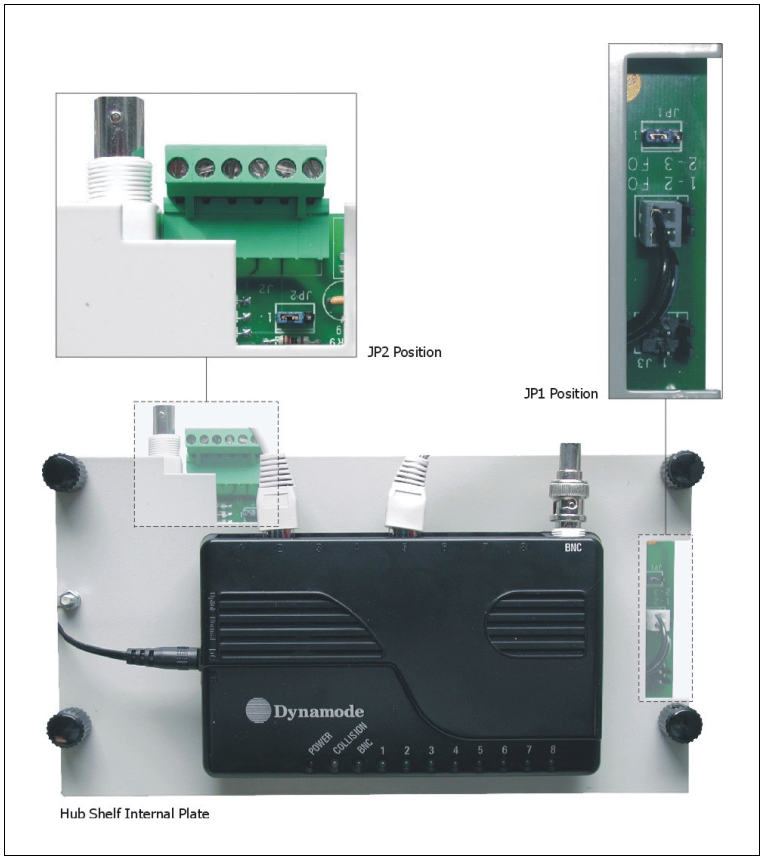
The 1pps Converter Board is located underneath the Hub shelf internal plate. It provides facilities to receive a pps via fibre, BNC (voltage pulse) or RS485, and then echo that input pps via fibre outputs, enabling pps distribution over long distances.

Note:
Fibre type is 62.5/125µm multimode.

The board has several jumpers that configure its operation. Access to these jumpers is provided through cut-outs in the Hub shelf internal plate.

Typically, the 1pps Converter Board is used to facilitate distribution of a pps signal between clusters of IDM DAUs. For example, a Master IDM DAU with an internal GPS will output a pps signal via RS485. This may be connected to a 1pps Converter Board RS485 input and so provide fibre pps signals for sending long distances to other IDM DAUs. The fibre pps from the 1pps Converter Board may be connected directly to the pps fibre input of remote IDM DAUs.

The 1pps Converter Board supports an external pps pulse via the BNC connector. The external pulse must be normally 0Vdc rising to 5Vdc, but not exceeding 20Vdc. Such an external pulse may be connected to the BNC observing the following polarity; BNC centre = voltage pulse, BNC outer = 0Vdc.The pulse must be greater than 10ms wide. The second is marked as the rising edge of this pulse.



1pps Converter Board Jumper Positions

JUMPER	POSITION	FUNCTION	COMMENT
JP1	1-2	RS485 pps input	Select source of pps input as RS485
JP1	2-3	Fibre or BNC pps input	Select source of pps input as Fibre or BNC
JP2	1-2	RS485 termination on	Fitted to last (or only) board in RS485 daisy chain
JP2	2-3	No RS485 termination	Fitted to boards which are not in the last RS485 daisy chain
JP3	1-2	Normal mode	Must be selected
JP3	2-3	Test mode	Not for user selection

Note that JP3 must be in position **JP3:1-2**.

JP2 must be in position **JP2:1-2**, unless there are multiple boards comprising a RS485 chain. In this case, boards in the chain must have **JP2:2-3** selected (no RS485 termination) and the last board in the chain must have **JP2:1-2** (to terminate the RS485 chain).

JP1 is user set to select the source of pps, either **JP1:1-2** to select the RS485 input as the source of the pps signal, or **JP1:2-3** to select both the fibre and BNC inputs as the source of the pps signal.

Note:
If **JP1:2-3** is selected (source of pps input is fibre or BNC) then only a single source of pps must be connected to the board, either the fibre or the BNC, but not both.
Additionally, with **JP1:2-3** selected, the RS485 will function as an output and echo the received pps pulse on the RS485.

Peripherals - Modem

For a single DAU installation, a modem can be connected to any IDM serial port to allow remote access to that particular DAU.

For a networked DAU installation, an internal modem in the LSU is used to allow remote access to it and the DAUs.

Modem access allows an operator to remotely configure DAU parameters and download data.

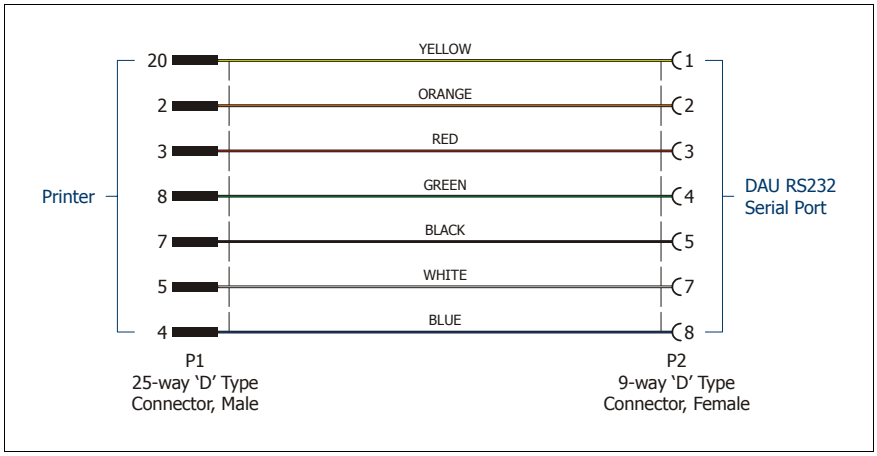
The IDM uses standard PPP for serial communications.

Peripherals - Printer

For a single DAU installation, an EPSON dot matrix printer can be directly connected to the DAU serial port for a basic format local hardcopy. Hathaway cable **16-1943** is used for this connection and its details are shown on the next page.

For a networked DAU installation, an EPSON dot matrix printer can be directly connected to the LSU parallel port for a basic format local hardcopy.

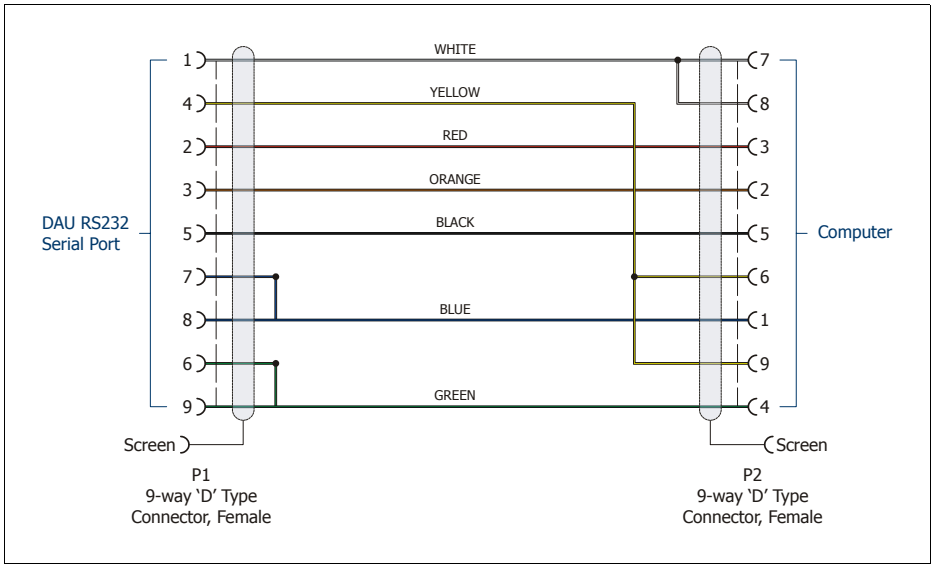
Local printout is for DFR records only.



DAU RS232 Port to Printer Cable (16-1943)

Peripherals - Local PC

A PC running Hathaway *Replay™ Plus* software can be directly connected to a serial port for local configuration and analysis of data. Hathaway cable **16-1949** is used for this connection and its details are shown below.



DAU RS232 Port to PC Cable (16-1949)

However, the most practical method of local connection is via the LAN where data transmission rates are much faster (10Mbits/s). The PC needs to be fitted with a standard Ethernet network card to connect in this way.

Hathaway

ReplayPlus

Replay™ Plus Installation

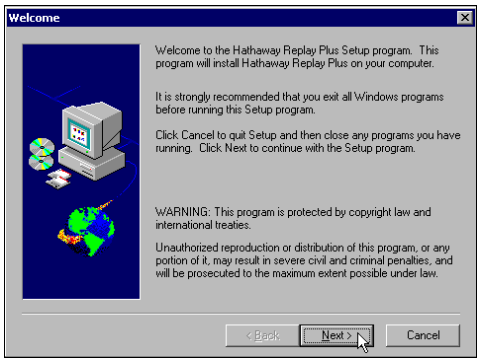
Installing Replay™ Plus

The *Replay™ Plus* software is supplied on a CD-ROM. To install the software, do the following:

1. Close all open Windows programs.

2. Place the *Replay™ Plus* CD-ROM in your CD-ROM or DVD drive.

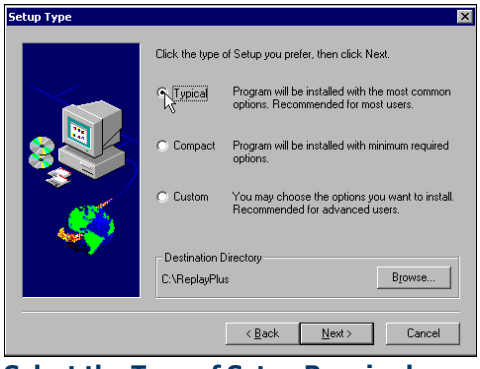
3. The setup program is automatically launched. The Qualitrol Hathaway Installation Wizard will appear. To continue, click on **Next >**


Welcome
Welcome to the Hathaway Replay Plus Setup program. This program will install Hathaway Replay Plus on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
< Back
Next >
Cancel

Qualitrol Hathaway Installation Wizard

Note:
Should the program not start automatically, use Windows Explorer to select the CD / DVD drive where the *Replay™ Plus* CD-ROM is located.
In the root directory open the **ReplayPlus** folder and double-click on the **SETUP.EXE** program.

4. Choose how you wish to install the program.


Setup Type
Click the type of Setup you prefer, then click Next.
Typical
Program will be installed with the most common options. Recommended for most users.
Compact
Program will be installed with minimum required options.
Custom
You may choose the options you want to install. Recommended for advanced users.
Destination Directory
C:\ReplayPlus
Browse...
< Back
Next >
Cancel

Select the Type of Setup Required

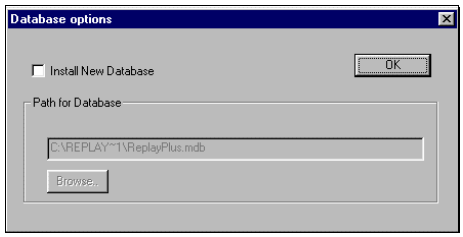
5. The following installations are possible:

- **Typical** (with all available features)
- **Compact** (with a minimum number of features) or
- **Custom** (with only those feature required)

6. The default destination directory will be displayed. This can be changed by clicking on **Browse...**and selecting the desired directory. Click on **Next >** to start the installation.

7. When the Database options dialog appears, read the following caution before proceeding:

Caution!
For reinstalls or upgrades, do **NOT** check Install New Database. Only check Install New Database when you no longer need any part of the previous database or if you are installing the *Replay™ Plus* software for the first time. If you check Install New Database this version of the software overwrites all database files. Before installing a new database be sure to archive all database files you may want to preserve.



Database Options

8. Verify the Path for Database is correct. If necessary, click **Browse...** and select the correct path.

9. Continue with the installation by following the instructions as prompted by the Qualitrol Hathaway Installation Wizard.

Note:
For *Replay™ Plus* to communicate with the IDM, the following operating system services are required; when using Windows 95/98, Dial-up Networking with TCP/IP must be installed; when using Windows NT 4.0, Remote Access Services (RAS) must be installed (consult your IT professional or Windows help for more assistance).

System Requirements

- Windows 9X / Me / NT 4.0 / 2000 / XP.
- Pentium 90MHz or better PC, 32Mb RAM, 1Gb hard drive
- An available serial port and modem for dial-up communications
- A network connection for Ethernet communications
- Microsoft Access for analysis when using custom queries and reports

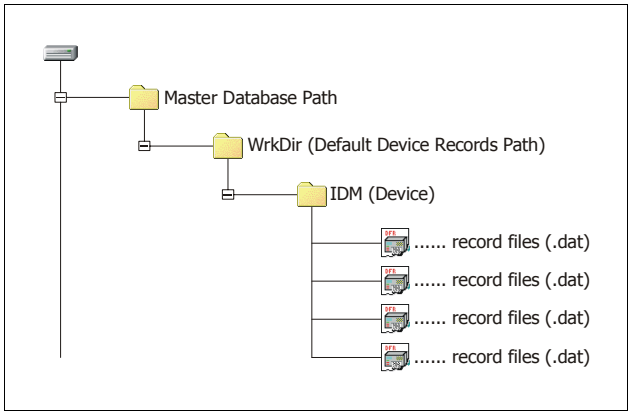
The Access Database and File Storage

About the Access Database

Replay™ *Plus* uses a Microsoft Access database to store information about IDM DAUs. The database is located in the folder specified during the installation of *Replay*™ *Plus*, by default this is **C:\ReplayPlus**. The default name of this database is **Replayplus.mdb**. If you use multiple databases they require different names or should be placed in different folders.

Folder Structure

Replay™ *Plus* creates working folders to store record data and the default working directory is **C:\ReplayPlus\WrkDir**. However, if a different directory is chosen for your database, that directory should also be used for your working folder. For example, if you choose to place a database called IDM.mdb in a directory C:\hathaway then your working directory should also be C:\hathaway.



Replay™ *Plus* **Hierarchical Folder Structure**

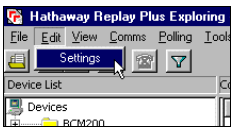
Changing to a Different Database

When you first run *Replay*™ *Plus* you are asked to specify the directory in which your database resides and at this point you may change to a different database if required.

System Database Location
Use this dialog to specify the location of a Replay Plus compatible database. This may be on a local drive or on a network shared drive.
Replay Plus
C:\REPLAYPLUS\ReplayPlus.mdb
OK
Browse
Quit
Do not show this dialog at start up again.

Specify Database Location

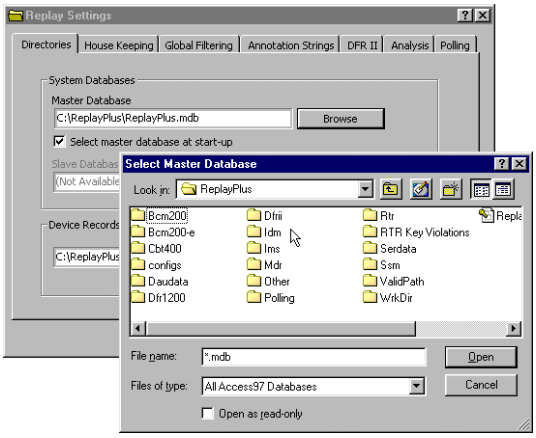
It is also possible to change to a different database while *Replay*™ *Plus* is open. To do this:



Edit, Settings

1. From the *Replay*™ *Plus* Explorer window click on **Edit** and then select **Settings**

2. This will open a dialog called Replay Settings. Open the **Directories** tab. In the System Databases field click on **Browse** in the Master Database field and locate the required database.



Browse for Database

3. In the Device Records field, click on **Browse**
Select the directory that you have chosen for the different database.

Note:
During installation *Replay*™ *Plus* creates a file called **ReplayPlus.new**. This is a default database and can be used should you need to install a 'clean' database. To do this save your original database under a unique name and rename the ReplayPlus.new file with the extension .mdb.

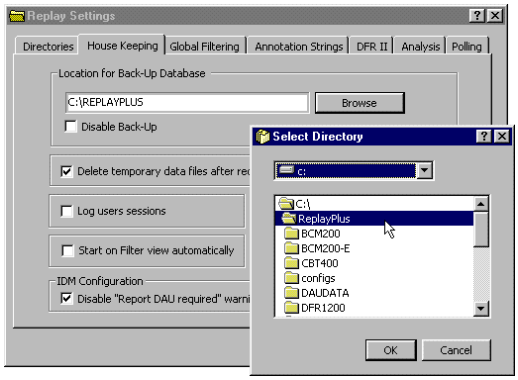
Backup Database

Replay™ *Plus* may be configured to create a backup copy of the *Replay*™ *Plus* database file when the program is closed. To do this:

1. From the *Replay*™ *Plus* Explorer window click on **Edit** and then select **Settings**

2. Open the **House Keeping** tab. Click on **Browse** in the Location for Back-Up Database field and specify a location for the backup database file.

3. Disable the **Disable Back-Up** check box ☐ to allow *Replay*™ *Plus* to create a backup copy of the database file.



Choosing Backup Database

4. When *Replay*™ *Plus* is closed, a backup copy of the database is made into the specified location. This file is called **ReplayPlusdbBackup.mdb**

Note:
This file is a backup copy of the database only and does not include any data records (data records are stored separately from the database).

Accessing the Demo Database

1. Install the *Replay*™ *Plus* software and follow the instructions.

2. Select the **Custom** installation. Check the **Demo files** and **Extras** options to install the demo files in a ..\demo folder inside the folder selected for the *Replay*™ *Plus* installation.

3. After the installation has been completed, run the *Replay*™ *Plus* software and click on **Edit** and then **Settings** on the toolbar.

4. This will open a dialog called Replay Settings. Open the **Directories** tab. In the System Databases field click on **Browse** in the Master Database field. Select **C:\ReplayPlus\demo\ReplayPlus.mdb**

5. In the Device Records field, click on **Browse** Select **C:\ReplayPlus\demo\WrkDir**

   The demo records can now be accessed using the *Replay*™ *Plus* Explorer.

Replay™ Plus Security

Security Overview

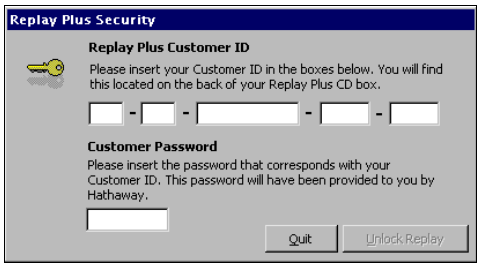
Replay™ *Plus* provides security features that allow additional users to be created or removed. Each user is assigned an access level which determines what features are available to them.

On installation of *Replay*™ *Plus* the user **Administrator** is created by default.

User - Administrator

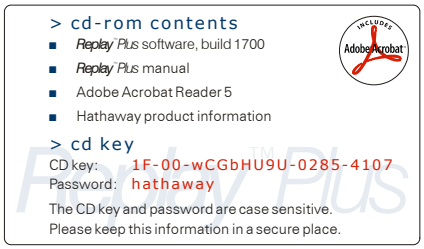
Administrator Password

The Administrator's password is the **Customer Password** that is supplied along with the **ReplayPlus Customer ID** on each *Replay*™ *Plus* CD.


Replay Plus Security
Replay Plus Customer ID
Please insert your Customer ID in the boxes below. You will find this located on the back of your Replay Plus CD box.
Customer Password
Please insert the password that corresponds with your Customer ID. This password will have been provided to you by Hathaway.
Quit
Unlock Replay

ReplayPlus Security

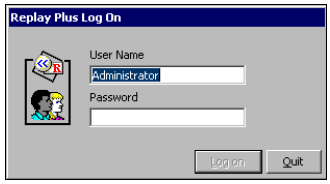
The ID and password are both case-sensitive and must be entered exactly as printed. This must be performed once, when a new build of *Replay*™ *Plus* is installed.


> cd-rom contents
Replay Plus software, build 1700
Replay Plus manual
Adobe Acrobat Reader 5
Hathaway product information
> cd key
CD key: 1F-00-wCGbHU9U-0285-4107
Password: hathaway
The CD key and password are case sensitive.
Please keep this information in a secure place.

Sample Customer ID and Password

Replay™ *Plus* Log On

Each time *Replay*™ *Plus* is started, the Log On dialog is displayed.



Log On Details

The "User Name" is the name of the user who is logging on, and may be altered. The "Password" is the assigned password for that user. The user name and password are case-sensitive.

The **Log on** button becomes active once an eight character password is entered. When **Log on** is clicked and the password has been validated *Replay*™ *Plus* will be loaded. If an invalid password is entered an error will be displayed and *Replay*™ *Plus* will not run.

Invalid Password

Quit will exit Replay Plus.

Administrator Privileges

The Administrator has unrestricted access to all features of *Replay*™ *Plus*. In addition, only the Administrator has access to the following high-level security features:

- Changing the Administrator password
- Changing the *Replay*™ *Plus* ID
- Disabling or enabling security
- The *Replay*™ *Plus* User Manager

Changing the Administrator Password

Only the user "Administrator" can change the Administrator password. To do this:

1. From the *Replay*™ *Plus* Explorer window click on **Tools** and then select **Change Password**

2. This will open a dialog called Change Password.

Changing the Password

3. Enter the new Administrator password. The password must be eight characters in length and re-entered for verification purposes. Click on **Accept** to use the new password.

Changing the *Replay™ Plus* Customer ID

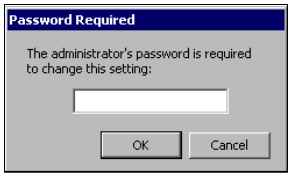
Only the user "Administrator" can change the *Replay™ Plus* Customer ID. To do this:

1. From the *Replay™ Plus* Explorer window click on **Tools** and then select **Change Key**
2. This will open the *Replay™ Plus* Security dialog.
3. Enter a valid ID and password and click on **Unlock Replay** to use the new *Replay™ Plus* Customer ID.

Disabling and Enabling Security

Only the user "Administrator" can disable the security features of *Replay™ Plus*. To do this:

1. From the *Replay™ Plus* Explorer window click on **Tools** and then select **Disable Security**



Enter Password

2. Enter a valid password.
3. Security will be disabled and this is confirmed.

Confirmation

Caution!
When security is disabled, the Log On dialog is not shown when *Replay™ Plus* is started and *Replay™ Plus* will launch without requesting a password. Disabling security will also remove access to the **User Manager**, **Change Password** and **Change Key** functions and these are removed from the **Tools** menu in the *Replay™ Plus* Explorer window.

To re-enable security:

1. From the *Replay™ Plus* Explorer window click on **Tools** and then select **Enable Security**
2. Enter a valid password.

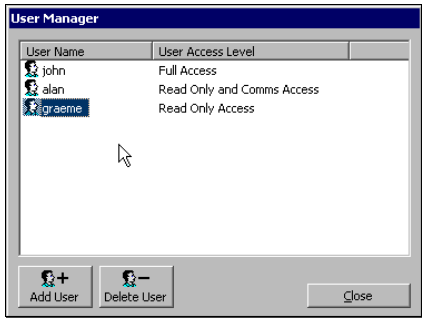
Confirmation

3. Security will be enabled and this is confirmed.

User Manager

The *Replay™ Plus* User Manager allows users to be created, edited and deleted. User access privileges are also set within the User Manager. The User Manager is accessible only to users with "Administrator" privileges. To access the User Manager:

1. From the *Replay™ Plus* Explorer window click on **Tools** and then select **User Manager**



The *Replay™ Plus* User Manager

2. This will open the User Manager dialog.

The User Manager displays all the currently defined users. In the example shown there are three users defined. Each user is listed by User Name and to the right the User Access Level displays the access level currently assigned to that user.

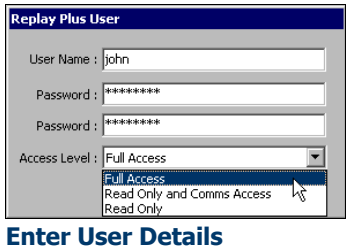
The access levels define which features of *Replay™ Plus* are available to each user. They are:

- Full Access
- Read Only and Comms Access
- Read Only Access

(Access levels are described in more detail later).

To add a new user to the *Replay™ Plus* User Manager:

1. Click on **Add User +**



Enter User Details

2. This will open the *Replay™ Plus* User dialog

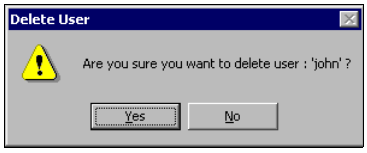
3. Enter a User Name. This name must be unique on your PC, i.e, two users cannot be assigned the same name. It can contain letters or numbers and is case-sensitive.

4. Enter a Password. The password is limited to eight characters. For security each character is displayed as an asterisk when it is typed and must be entered twice. Both entries must be identical.

5. Select a user Access Level from the drop-down list. This determines the range of operations available when the user is logged onto *Replay*™ *Plus*. Click on **OK** when all details have been entered.

To delete an existing user from the *Replay*™ *Plus* User Manager:

1. Select the user to be deleted from the User Name list in the User Manager dialog and click on **Delete User -**

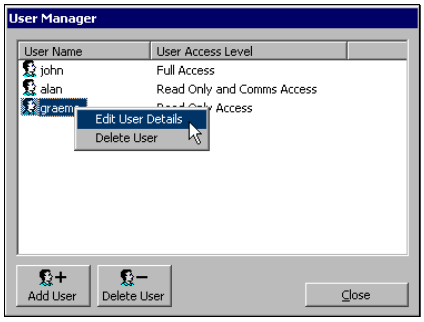


Delete User

2. Click on **Yes** to delete the user.

To edit an existing user in the *Replay*™ *Plus* User Manager:

1. Right-click on the user (whose details are to be edited) from the User Name list in the User Manager dialog and click on **Edit User Details**



Edit User Details

2. This will open the *Replay*™ *Plus* User dialog. Edit the details and click on **OK**

User Access Level Privileges

Access to the various features of *Replay*™ *Plus* of are dependant on the User Access Level assigned. These are as follows:

User - Administrator

- NO RESTRICTIONS
- All features are available, including **Configure IDM**, **Reset DAU**, **Auto Polling** and **Remote Manual Trigger**
- Access to **User Manager**, **Change Password**, **Change Key** and **Disable Security**

Full Access

- As Administrator except NO ACCESS to **User Manager**, **Change Password**, **Change Key** and **Disable Security**

Read Only and Comms

- As Full Access with limited functionality for Stations, IDM Devices and IDM Records
- NO ACCESS to **Configure IDM**, **Retrieve IDM Config**, **Reset DAU**, **Set Clock**, **Delete Device**, **Add New Station**, **Rename Station**, **Delete Station**, **Add New Device**, **Edit Annotation**, **Edit Info**, **Delete Record**

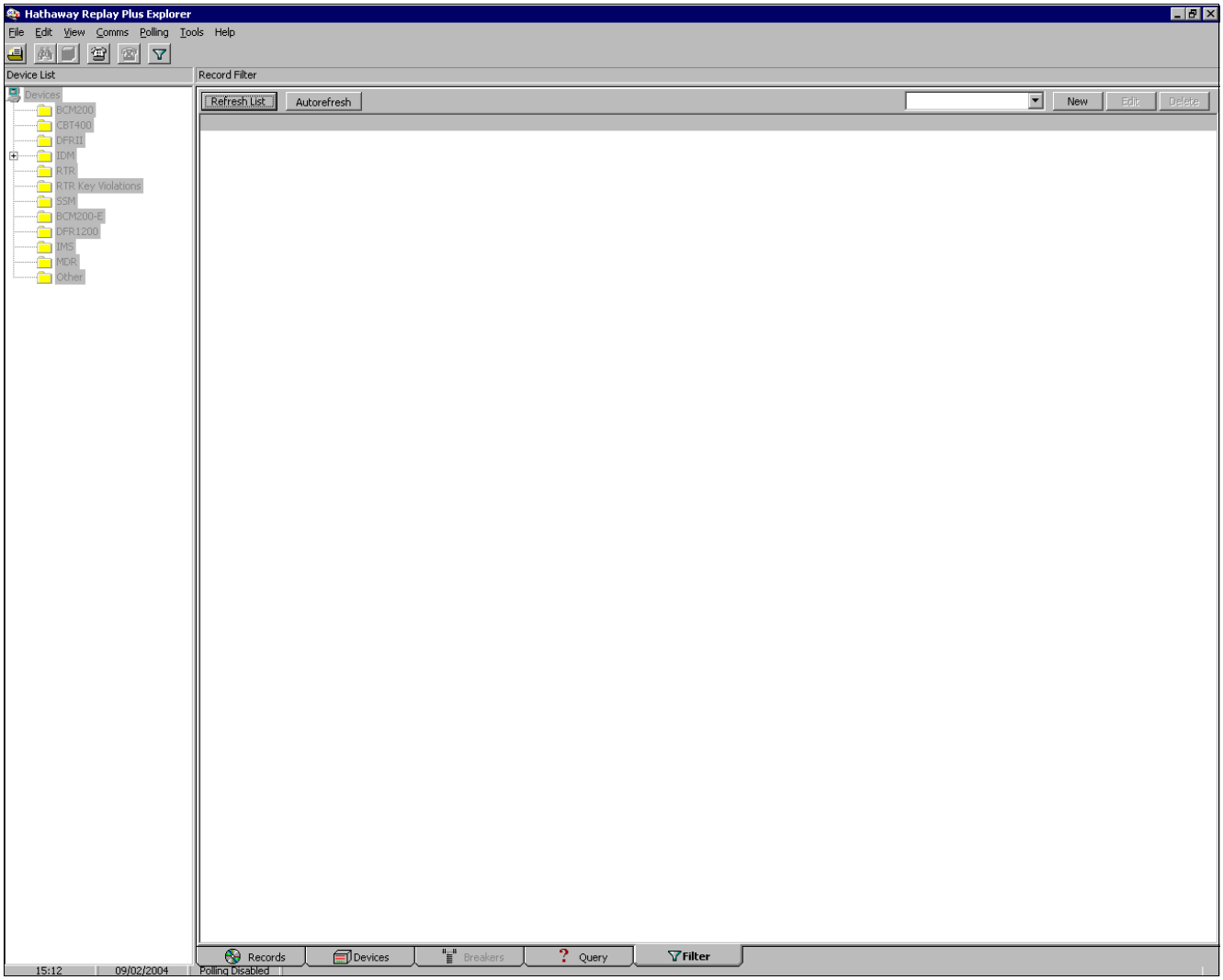
Read Only

- As Read Only and Comms Access, with no Comms and limited functionality for Record Import, IDM Devices and IDM Records.
- NO ACCESS to **Comms**, **Import File**, **Import Directory**, **Preview File**, **Device Details**, **Auto Polling**, **Load Directory**, **Remote Manual Trigger**, **Get SERs**, **View SER Log**, **Poll Station**, **Poll Device**

Replay™ Plus Explorer

The Replay™ Plus Explorer Window

All IDM devices and records are accessed using the Replay™ Plus Explorer window shown below. This is the default display when the software is loaded.



The Replay™ Plus Explorer Window

Its layout has a tree view on the left showing a **Device List** of the products supported on the first level and listing the locations or substations where equipment is installed at the second level. A third level shows the devices installed at the selected location. Double-clicking on a first level folder icon opens the next level where it is available.

The pane on the right contains a **List View** with five different display options - Records, Devices, Breakers, Queries and Filter.

These are selected by clicking on the appropriate tab at the bottom of the List View pane.

Display Options

Their functions are as follows:

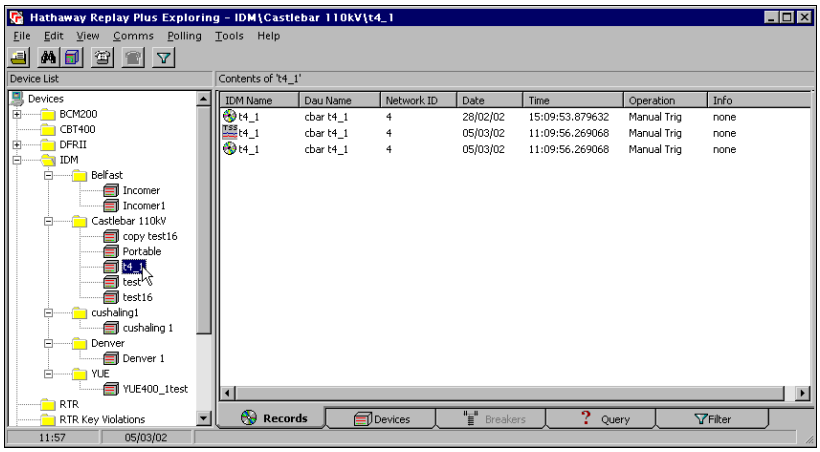
OPTION	FUNCTION
Records	A list of records available in the selected Station
Devices	A list of devices installed in the selected Station
Breakers	This option is not available when using the IDM
Queries	Displays lists of records generated using Microsoft Access
Filter	A "filtered" version of the Records tab - listing only those records that meet a specified criteria

Using The Device List Tree

The *Replay*™ *Plus* Device List works similar to Windows Explorer. Selecting a Station from the Device List will display all records for that Station in the main Records pane. The user may also expand open a Station - either by double-clicking on it or clicking the ⊞ ⊟ tree icons - to show the devices under that Station. These are the same devices which appear in the Devices tab for each station.

Selecting a device under a Station will display only the records which are associated with that particular device. The records displayed when a device is selected are a subset of the records for that Station. In effect, the device acts as a filter.

The example below shows three records in the List View pane for the "t4_1" device at Station "Castlebar 110KV".

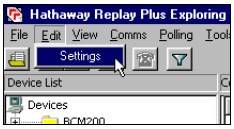


Browsing Devices in the Device List

The title bar on the *Replay*™ *Plus* Explorer window displays the product name "IDM" followed by the Station "\Castlebar 110kV" followed by the selected device "\t4_1".

Changing the Default Device List Settings

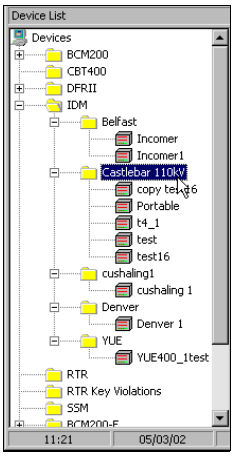
Replay™ *Plus* displays the IDM devices in the Device List on start-up by default. However, it is possible to change the settings so that only the Stations are displayed. To do this:



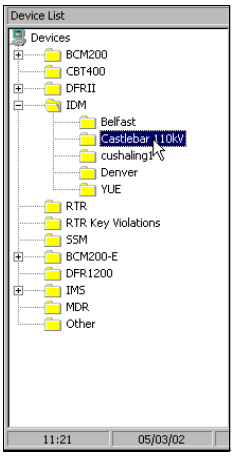
Edit, Settings

1. From the *Replay*™ *Plus* Explorer window click on **Edit** and then select **Settings**

2. This will open a dialog called Replay Settings. Open the **House Keeping** tab and disable the **Show IDM devices under stations** check box ☐. Click on **OK**.



Show IDM Devices Under Stations - Enabled



Show IDM Devices Under Stations - Disabled

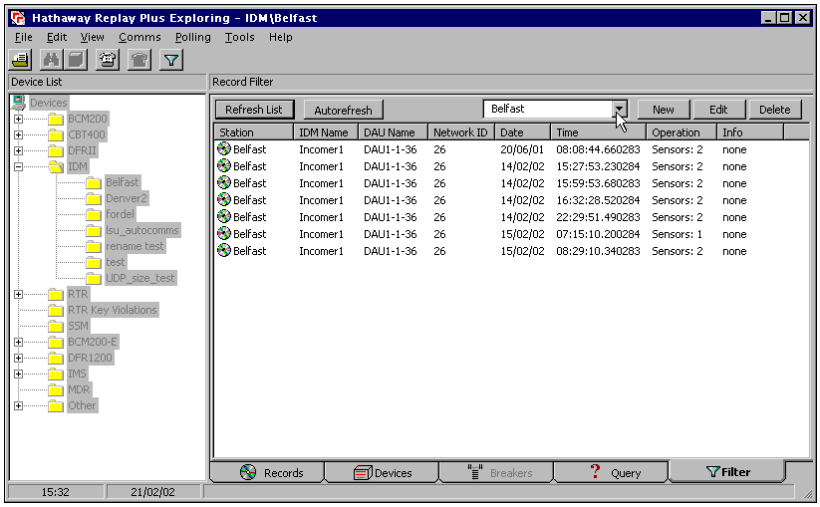
Using The Filter Display Option

Filter Overview

The **Filter** tab

, a "filtered" version of the Records tab, allows the user to apply filter criteria and to list only those records that meet a specified criteria (such as date, station name, etc.).

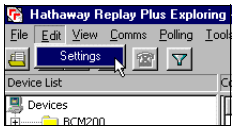
When is launched, the opening display will show the **Filter** tab. The filter applied will be the filter in use when *Replay*™ *Plus* was last closed. The records that meet the filter criteria will be displayed in the List View pane.


Hathaway Replay Plus Exploring - IDM\Belfast
File Edit View Comms Polling Tools Help
Device List
Record Filter
Refresh List
Autorefresh
Belfast
New
Edit
Delete
Station IDM Name DAU Name Network ID Date Time Operation Info
Belfast Incomer1 DAU1-1-36 26 20/06/01 08:08:44.660283 Sensors: 2 none
Belfast Incomer1 DAU1-1-36 26 14/02/02 15:27:53.230284 Sensors: 2 none
Belfast Incomer1 DAU1-1-36 26 14/02/02 15:59:53.680283 Sensors: 2 none
Belfast Incomer1 DAU1-1-36 26 14/02/02 16:32:28.520284 Sensors: 2 none
Belfast Incomer1 DAU1-1-36 26 14/02/02 22:29:51.490283 Sensors: 2 none
Belfast Incomer1 DAU1-1-36 26 15/02/02 07:15:10.200284 Sensors: 1 none
Belfast Incomer1 DAU1-1-36 26 15/02/02 08:29:10.340283 Sensors: 2 none
Records
Devices
Breakers
Query
Filter
15:32
21/02/02

Replay™ *Plus* **Explorer Window showing Filtered Records**

Changing the Default Tab Settings

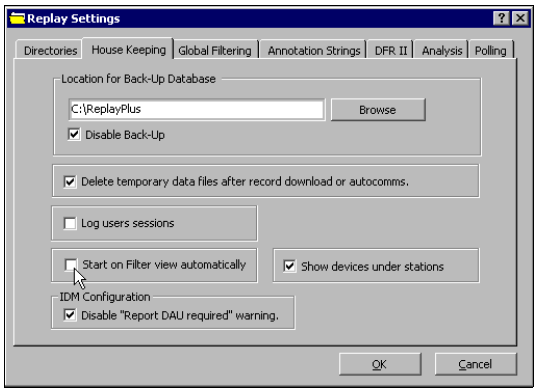
Replay™ *Plus* displays the **Filter** tab on start-up by default. However, it is possible to change the settings so that the **Records** tab is displayed by default. To do this:



Edit, Settings

1. From the *Replay*™ *Plus* Explorer window click on **Edit** and then select **Settings**

2. This will open a dialog called Replay Settings. Open the **House Keeping** tab and disable the **Start on Filter view automatically** check box ☐ and click on **OK**



Changing the Default Display Option

Note:
Refer to "Advanced Filtering" later in this chapter for more detailed information on setting filter display options.

Configuring Ethernet Communications

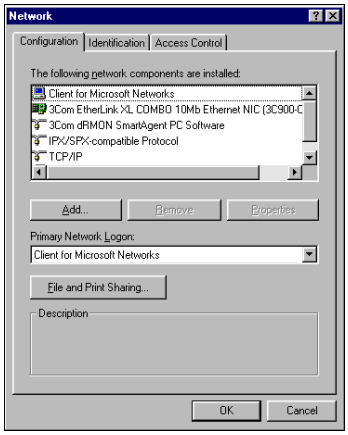
Installing TCP/IP for Network Communications

To communicate with an IDM using Ethernet the PC must be equipped with an Ethernet network adapter, either ISA, PCI or PCMCIA.

The IDM Ethernet communications uses the TCP/IP protocol and so the following network components are required: -

- A network adapter driver
- TCP/IP protocol on the network driver to be used

1. From the Windows desktop right click on **Network Neighborhood** and select **Properties** to show the Network dialog.

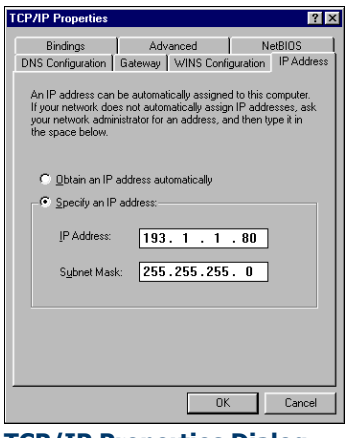


Network Dialog

2. If not already installed choose **Add...** to add the driver for the network adapter to be used and install the Microsoft TCP/IP protocol.

3. Next select **TCP/IP -> "Network Adapter"** and click **Properties** to display the TCP/IP Properties dialog.

4. Enter the IP address and subnet mask to be used to communicate with the IDM.


TCP/IP Properties
Bindings
Advanced
NetBIOS
DNS Configuration
Gateway
WINS Configuration
IP Address
An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.
Obtain an IP address automatically
Specify an IP address:
IP Address:
193. 1 . 1 . 80
Subnet Mask:
255.255.255. 0
OK
Cancel

TCP/IP Properties Dialog

5. If this PC is to be used with an IDM on a different network segment then select the **Gateway** tab and enter the default gateway for the PC network segment.

Installing TCP/IP for Dial-Up or Direct Connect Asynchronous Communications

Dial-up or direct connect asynchronous communications uses a serial implementation of TCP/IP known as PPP. For PPP communications the operating system requires:

- A dial-up adapter driver
- TCP/IP protocol on the dial-up adapter

These can be installed, as above from Network Neighborhood properties.

Caution!
Do NOT adjust **TCP/IP-> Dial-up Adapter Properties** as the *Replay™ Plus* software will automatically make any adjustments required.

Installing Direct Connect Communications - Windows 95/98

To communicate directly with the IDM through the COM1 port a Null modem driver must be installed on the PC. This type of communications also uses PPP.

1. Place the *Replay™ Plus* CD-ROM in the CD-ROM drive. (Click on **Cancel** if *Replay™ Plus* automatically begins to install).

2. From the Windows **Control Panel** double-click on **Modems**

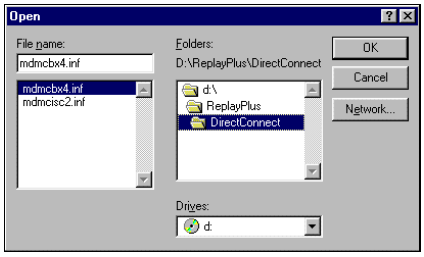
3. Select **Add**

4. Select modem type **Other**

5. Enable the **Don't detect my modem; I will select it from a list** check box ☑.

6. Click on **Have Disk...**, then **Browse...**

7. From the Open dialog select **D:\ReplayPlus\DirectConnect\mdmcbx4.inf** (use your CD-ROM drive letter ID as appropriate).

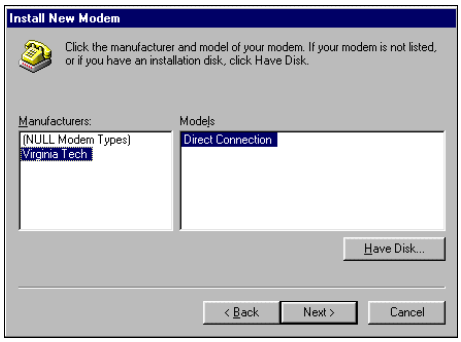


Selecting .inf File

8. Click **OK**

9. Click on **OK** in the Install From Disk dialog.

10. In the Install New Modem dialog select **Virginia Tech** from the Manufacturers lis and select **Direct Connection** from the Models list.


Install New Modem
Click the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.
Manufacturers:
Models
(NULL Modem Types)
Virginia Tech
Direct Connection
Have Disk...
< Back
Next >
Cancel

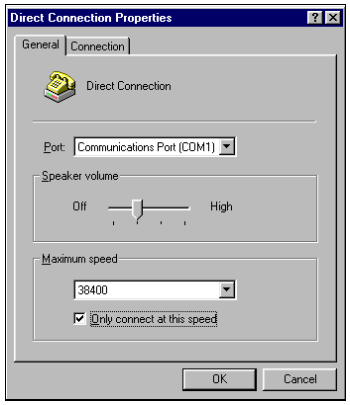
Selecting Direct Connection

11. Click on **Next>** and select the com port to be used.

12. Click on **Finish**

Modems Properties

13. From the Modems Properties dialog select **Direct Connection** and click on **Properties**



Setting Direct Connection Properties

14. From the Direct Connection Properties select a baud rate of **38400** and enable the **Only connect at this speed** check box ☑.

15. Click **OK**

Note:
Further DAU com port configuration is required within *Replay™ Plus*. Refer to Adding and Configuring a Modem later in this section for more information.

Installing Direct Connect Communications - Windows NT

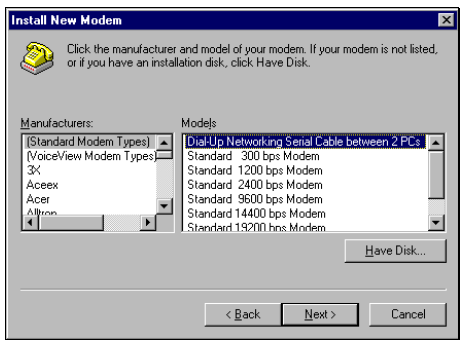
Windows NT has its own null modem driver. To install this:

1. From the Windows NT **Control Panel** double-click on **Modems**

2. Select **Add**

3. Select **Don't detect my modem; I will select it from a list**

4. From the Manufacturers list select **(Standard Modem Types)** and from the Models list select **Dial-Up Networking Serial Cable between 2 PCs**.


Install New Modem
Click the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.
Manufacturers:
Models
(Standard Modem Types)
(VoiceView Modem Types)
3X
Aceex
Acer
Dial-Up Networking Serial Cable between 2 PCs
Standard 300 bps Modem
Standard 1200 bps Modem
Standard 2400 bps Modem
Standard 9600 bps Modem
Standard 14400 bps Modem
Have Disk...
< Back
Next >
Cancel

Installing Null Modem Driver - Windows NT

Note:
Windows NT will not support two modems at once. As direct connect uses a modem driver it may be necessary to temporarily uninstall any existing modems setup on your PC.

Making a Network Connection to the IDM

Use a standard UTP network cable to connect to the IDM if the connection is made using a hub. While it is always recommended to connect to the IDM using a hub it is possible to connect a PC directly to the IDM using a crossover UTP network cable.

Since the IDM is equipped with a fibre and twisted pair network port and the auto-detect defaults to the fibre port it is not possible to "walk up and plug in" with a crossover cable. The network connection must be established as the DAU is powered up.

It is possible to Ping a DAU to verify that a network connection is established by typing **Ping <IP Address>** from a DOS window. A valid connection is indicated by a response of the form:

Reply from 194.168.175.35: bytes=32 time=2ms TTL=254

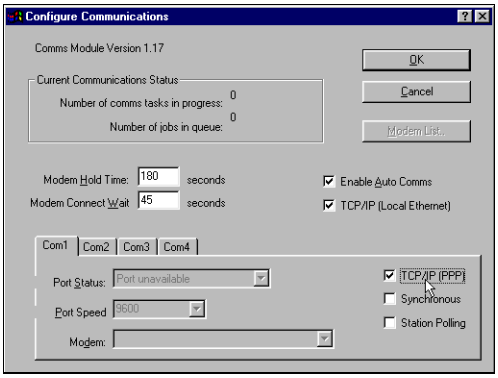
While error conditions result in messages including:

Request timed out
The network is unreachable

Configuring *Replay*™ *Plus* for Network Communications

1. From the **Comms** menu in *Replay*™ *Plus* select **Configure Comms**

2. Enable the **TCP/IP (Local Ethernet)** check box.



Enabling TCP/IP

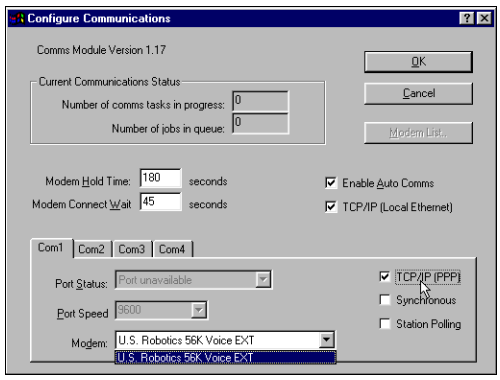
Configuring *Replay*™ *Plus* for Dial-Up or Direct Communications

1. From the **Comms** menu in *Replay*™ *Plus* select **Configure Comms**

2. Enable the **TCP/IP (Local Ethernet)** check box.

3. Enable the **TCP/IP (PPP)** check box for the com port to be used.

4. Select the modem to be used from the drop-down list.

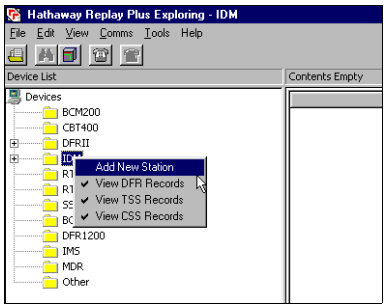


Enabling Dial-Up or Direct Communications

Adding a New Installation

Creating a New Station

To enter configuration information for a new installation the first step is to create an entry for the new location or Station. To do this:



Adding a Station

1. Right-click on the IDM folder in the Device List on the left and select **Add New Station**

2. Enter a name for the new Station then click **OK**

3. Click on the new station to select it and you are now ready to take the next step and create a new device.

Creating a New Device

1. Select the required Station from the Device List on the left.

2. In the List View on the right select the **Devices** tab

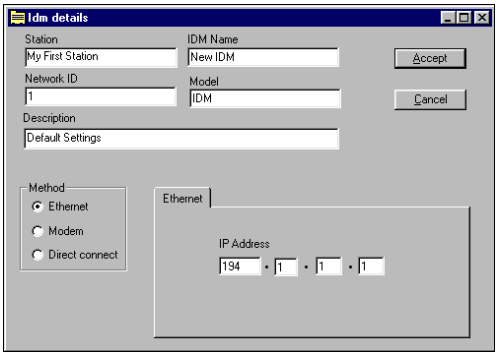
at the bottom.

3. This will display a list of any existing devices in the Station. Right-click on a blank area in the List View and select **Add New Device** to display the IDM Details dialog.

This dialog is used to name the device, specify how we will communicate with it and provide details such as phone number, IP address, etc. Should we select one mode of communications now, say Ethernet, it is possible to change to any of the alternatives later.

Ethernet Communications

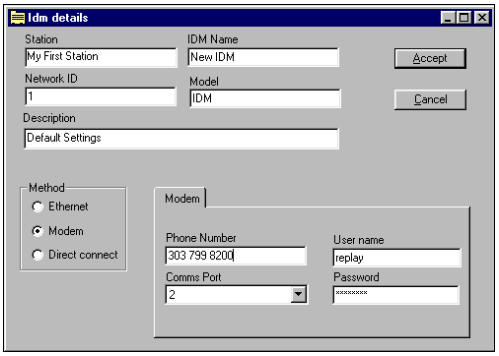
When selecting Ethernet communications we must specify the Method as **Ethernet**, the IDM Name and the IP Address. If the installation is not going to be directly connected to a network then use the default IP Address. Otherwise consult your network administrator for details of appropriate IP Addresses.



Ethernet Communication Details

Modem Communications

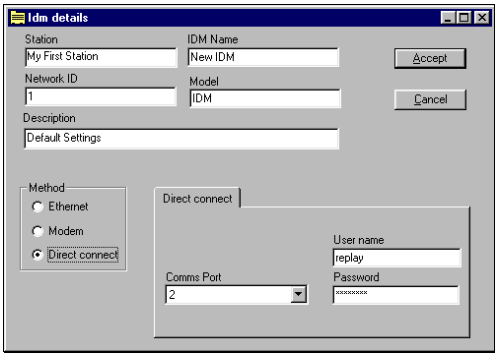
When selecting Modem communications we must specify the Method as **Modem**, the IDM Name, the telephone number and the PC Com port to which the modem will be attached.



Modem Communication Details

Direct Connection (RS232)

When selecting Direct Connect communications we must specify the Method as **Direct connect**, the IDM Name and the PC Com port that will be used for communications.

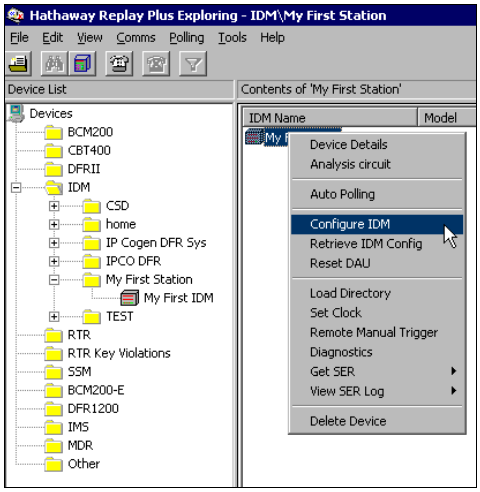


Direct Connect Details

Configuring an IDM

Having made an entry in the Devices tab for a new IDM we now need to enter all the configuration information.

1. Right click on the entry in the List View and select **Configure IDM**



Configure IDM

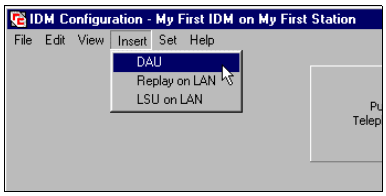
2. The IDM Configuration dialog will be displayed.

This is where we enter all device configuration including analog and event channel labels, trigger settings, record lengths etc. This dialog provides a graphical user interface for specifying all equipment that will be installed in the substation including the DAU itself, an LSU if required, modems and clock synchronization equipment.

Adding a DAU, LSU or PC

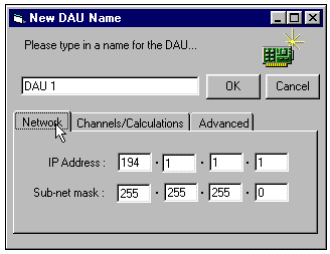
Adding a DAU

1. From the IDM Configuration dialog select **Insert -> DAU**



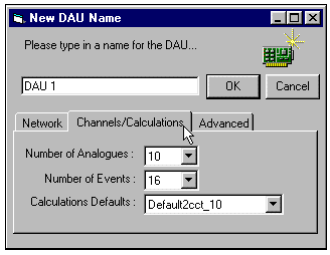
Inserting a DAU

2. The New DAU Name dialog box is displayed. This is used to confirm the DAU IP Address and to assign a DAU name. Additionally, the number of analog and event channels is specified, along with the number of circuits. Alternatively, a new DAU can be created based on the configuration of an existing DAU.



New DAU Name - Network Details

3. The IP Address should be the same as the IP address specified in the IDM Details dialog and the IP Address on the DAU Configuration sheet supplied with the equipment.



New DAU Name - Channels/Calculations

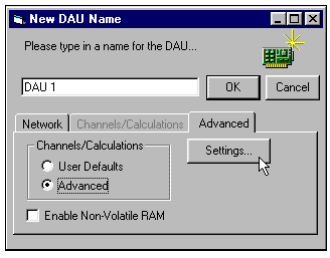
4. In the **Channels/Calculations** tab specify the number of analog channels (10 or 16) and event channels (8, 16, 24 or 32) according to your DAU type.

5. The choice of Calculations Defaults depends on the number of analogs specified. If 10 analogs have been specified, there is only one possible setting:

- Default2cct_10 - 2 circuits, 10 analog channels

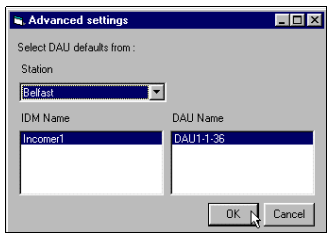
However, if 16 analogs have been selected, there are three possible settings for the calculations default:

- Default2cct_16 - 2 circuits, 16 analogs
- Default3cct_16 - 3 circuits, 16 analogs
- Default4cct_16 - 4 circuits, 16 analogs



New DAU Name - Advanced Settings

6. The **Advanced** tab allows DAUs to be created based on the settings of existing DAUs. By default, the settings defined under the Channels/ Calculations tab (above) are applied to a new DAU.

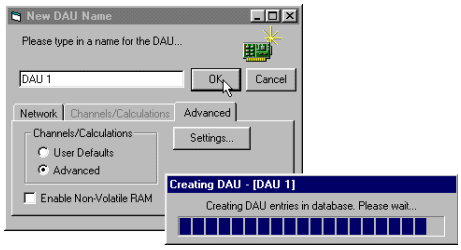


Advanced Settings

7. To supercede these defaults click on **Settings...** to open the Advanced Settings dialog.

8. This dialog allows the default configuration values for a new DAU to be derived from an existing DAU. The Station drop-down list shows all existing IDM stations. The IDM Name field lists all the IDM devices at the selected station and the DAU Name field shows the name of the DAU at the selected IDM.

9. Click on **OK** to return to the New DAU Name dialog. Unless the User Defaults option is selected (see previous), when **OK** is clicked the DAU will be created with defaults from the chosen Advanced DAU.

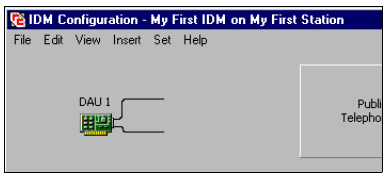


Creating Advanced DAU

10. Note that when Advanced is the chosen option, it is not possible to specify Channels/Calculations - that tab is disabled. When using Advanced, the number of analogs and events, and the calculations defaults, are derived from the DAU chosen in the Advanced settings dialog.

11. The configuration for a new DAU may be created with non-volatile support, allowing non-volatile RAM to be selected as an output destination for DFR and TSS records. If non-volatile RAM is to be supported by the DAU, then the **Enable Non-Volatile RAM** check box should be enabled ☑.

12. When all new DAU details have been completed, an icon representing the DAU will appear in the IDM Configuration dialog.



New DAU Added

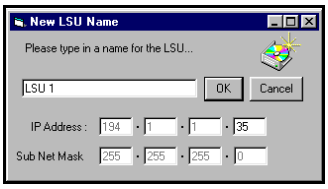
13. There are two connections on the right side of the DAU icon.

These represent the two DAU serial ports COM1 and COM2 with These represent the two DAU serial ports COM1 and COM2 with COM1 at the top. The COM ports can be configured by right clicking on these connections.

Adding a LSU or PC

If an LSU or a PC running *Replay™ Plus* is to be installed in the substation then these are installed in a similar fashion.

1. If a LSU is to be added, select **Insert -> LSU on LAN** from the IDM Configuration dialog. The following dialog will be displayed and it is used to specify the LSU IP Address and assign it a name.

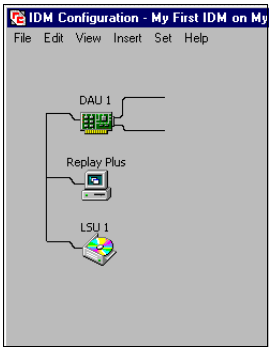


Details of the LSU IP Address is included on the DAU Configuration sheet.

New LSU Details

2. If a *Replay™ Plus* PC is to be installed in the substation, select **Insert -> Replay on LAN** from the IDM Configuration dialog. The following dialog will be displayed and it is used to specify the PC's IP Address and assign it a name.

3. When all new LSU and/or *Replay™ Plus* PC details have been completed, icons representing the LSU and *Replay™ Plus* PC will appear in the IDM Configuration dialog.



DAU, LSU and *Replay™ Plus* PC Added

Note:
The IP addresses selected for the DAU, LSU and PC must all have the same Network ID. For more details refer to Appendix D - About IP Addresses.

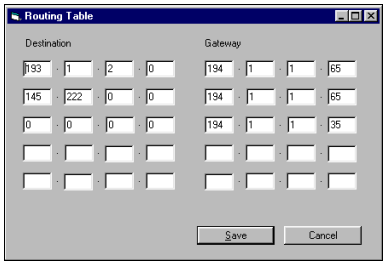
Setting the Default Gateway

If it is intended to have direct network communications between the IDM and remote computers then a default gateway must be specified in the configuration.

1. Select **Edit -> Routing Table** from the IDM Configuration dialog to display the Routing Table dialog.

2. In the Destination side of the table enter the Net ID, the network portion of the IP Address of the remote devices that will be communicating with the IDM.

3. In the Gateway side of the table enter the IP Address of the Gateway to be used.



Setting the Default Gateway

To communicate with a PC with IP Address 193.1.2.131 the entry in the routing table should be 193.1.2.0 since this is the Network Address of this Class C IP Address.

To communicate with a PC with IP Address 145.222.9.66 the entry in the routing table should be 145.222.0.0 since this is the Network Address of this Class B IP Address. (Details of the Default Gateway can be obtained from your network administrator).

Adding a Time Source to a DAU

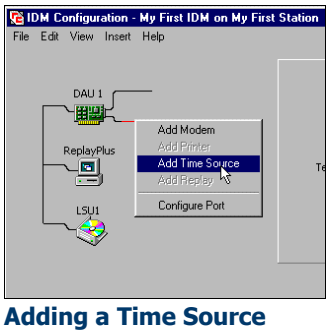
If the DAU being configured is the only one in the installation or if it is to be a Time Master in a multiple DAU installation then it can derive time from its own free-running internal clock or it can be synchronized to an external time source. The following time synchronization options are available:

- Internal GPS decoder
- Internal IRIG-B decoder
- External Serial NGTS time string

All of these options use the COM2 serial port to transfer time synchronization information to the DAU microprocessor.

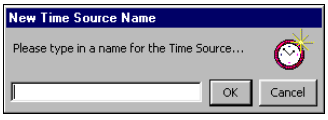
Note:
If an IRIG-B or GPS decoder are to be used then jumpers **J24** and **J25** on the CPU board must be set to the **B** position which dedicates COM2 for time synchronization and it is unavailable for other functions.

1. To configure the DAU COM2 port for time synchronization right click on the connection from the icon and select **Add Time Source**



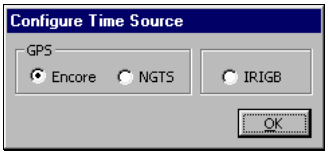
Adding a Time Source

The New Time Source Name dialog will be displayed.



Add a New Time Source Name

2. Click **OK** then select the type of time source from the following dialog.

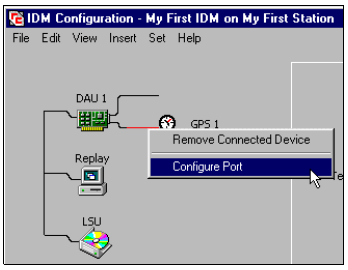


Configure the Time Source

3. Select **Encore** for an internal GPS decoder. Select **NGTS** to synchronize to an external GPS clock using the NGTS protocol.

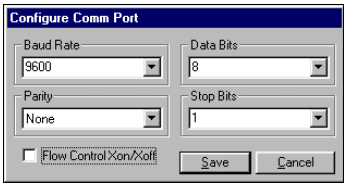
   Select **IRIG-B** to use an external TTL IRIG-B signal.

4. We now need to configure the serial port for the time source being used. Whatever time source has been attached to a COM port of a DAU, the configuration of the serial port must match that of the time code device.
   The black line between the DAU icon and the time source icon represents the serial port, where the upper line represents COM1 of the DAU and the lower line represents DAU COM2.



Right-click on the required serial port and select **Configure Port**.

Configure Time Source Port



Time Source Port Settings

5. The settings made in this dialog box must match those of the device supplying the time code.

Port Settings for an Internal GPS Decoder / Internal IRIG-B Decoder

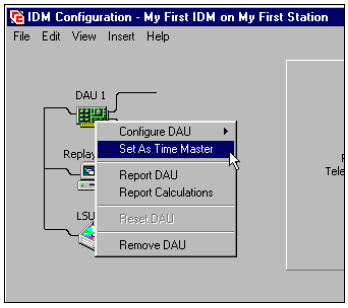
The Baud Rate should be set at **9600**. Data Bits should always be set at **8**, Parity should always be set at **None** and Stop Bits should always be set at **1**. The **Flow Control** check box should always be disabled ☐.

Port Settings for an External NGTS Device

The port settings must match the settings of the NGTS device. If the NGTS device is a Telefault GPS from Hathaway, the default settings are **1200** Baud, **7** Data Bits, Parity **None**, **2** Stop Bits and **Flow Control** disabled ☐.

Configuring a DAU as a Time Slave

If the DAU is to be synchronized by another DAU in the installation then it is configured as a time slave by right-clicking on the DAU and un-checking the **Set As Time Master** option in the menu.

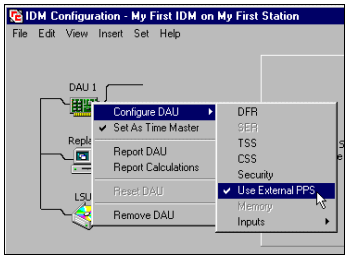


Setting DAU as a Time Slave

Configuring a DAU with External PPS

To configure the DAU with external PPS:

1. Right-click on the DAU icon and check ✓ the **Set As Time Master** option.

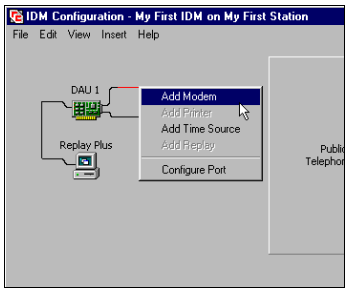


Use External PPS

2. Right-click on the DAU icon again and from the menu select **Configure DAU ->** and from the sub menu check ✓ the **Use External PPS** option.

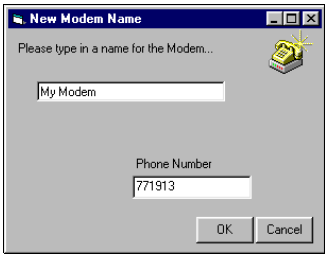
Adding and Configuring a Modem

If a modem is to be used for remote communications to the DAU then it needs to be added and configured. A modem can be installed on COM1 or COM2. However, if a GPS module is present in the DAU it requires COM2 leaving only COM1 free for the modem.



Adding a Modem

1. Add a modem by right-clicking on the required serial port and selecting **Add Modem**.

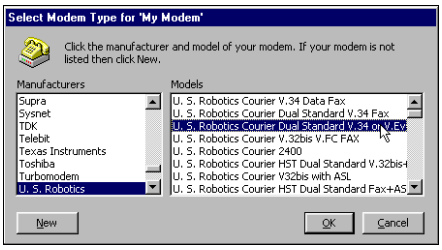


Modem Name and Number

2. Add a Modem name and DAU phone number to the dialog box as shown.

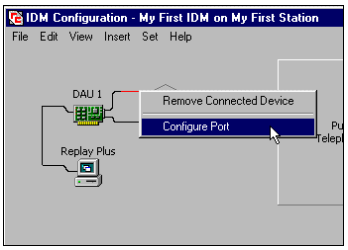
3. To configure the modem right-click on the modem and select **Configure Modem**.

4. In the dialog box shown select the manufacturer and model of modem to be used.



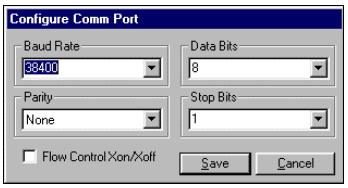
Modem Type

5. We now need to configure the serial port for the modem being used.


IDM Configuration - My First IDM on My First Station
File Edit View Insert Set Help
DAU 1
Remove Connected Device
Configure Port
Replay Plus

Configure Modem Port

Right-click on the required serial port and select **Configure Port**.



Modem Port Settings

6. A modem connection can sustain a Baud Rate of **38400**.

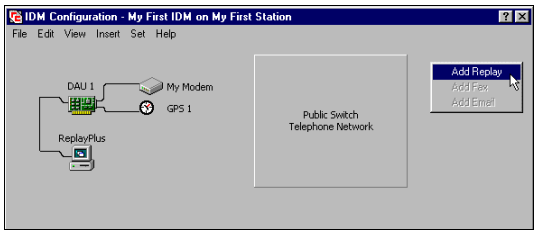
Data Bits should always be set at **8**, Parity should always be set at **None** and Stop Bits should always be set at **1**. The **Flow Control** check box should always be disabled ☐.

Note:
All baud rates within Windows must match the baud rate of the com port on the DAU. Windows settings for both mode and appropriate com port should be set as above.

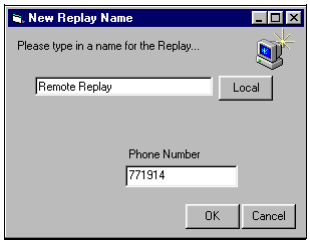
Adding a Remote *Replay™ Plus* Dial-Up PC

If the DAU is to be configured to poll or automatically transfer new fault records via its modem to a remote *Replay™ Plus* PC this too must be added to the configuration.

1. Right click on the extreme right of the IDM Configuration dialog as shown below and select **Add Replay**

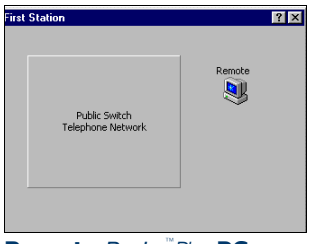


Adding a *Replay™ Plus* PC



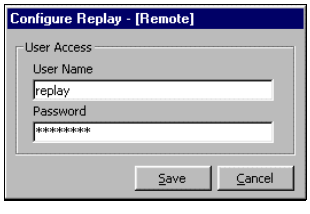
Replay™ Plus PC Name and Telephone Number

2. In the dialog box enter a name for the PC and the PC telephone number.



Remote *Replay™ Plus* PC Added

3. An icon representing the remote *Replay™ Plus* PC will appear on the right of the IDM Configuration dialog.

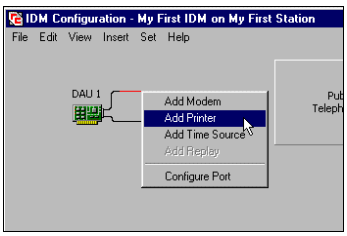


4. To configure the remote *Replay™ Plus* PC, right-click on the icon and select **Configure Replay**

5. Enter replay in the User Name text box and hathaway in the Password text box type (both lowercase). Click on **Save**

Adding and Configuring a Local Printer

If a printer is to be used for local printing of SER and DFR records then it needs to be added to a DAU and configured.



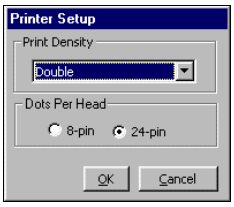
Adding a Printer

1. Add a printer by right-clicking on the required serial port and selecting **Add Printer**.

Printer Name

2. In the dialog box shown enter a name for the printer.

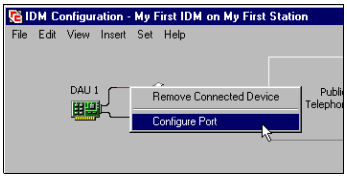
3. To configure the printer right-click on the printer and select **Configure Printer**.



Printer Setup

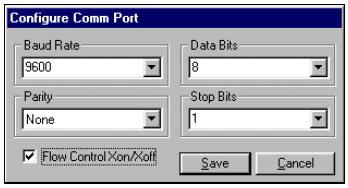
4. Use the Print Density drop-down list to select the quality of the printout. Select **8-pin** for an 8-pin dot matrix printer (e.g, an Epson LX-300) and **24-pin** for a 24-pin dot matrix printer (e.g, an Epson LQ-300).

5. We now need to configure the serial port for the printer being used.


IDM Configuration - My First IDM on My First Station
File Edit View Insert Set Help
DAU 1
Remove Connected Device
Configure Port

Configure Printer Port

Right-click on the required serial port and select **Configure Port**.



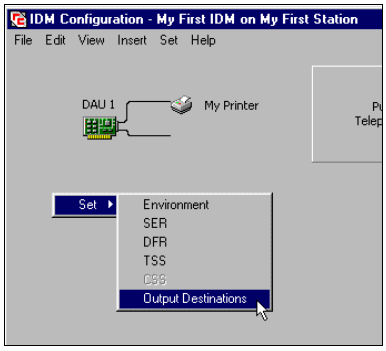
Printer Port Settings

6. The Baud Rate will default to **9600**. This should be set to correspond with the baud rate of the printer being used.

(Refer to your printers documentation for more information).

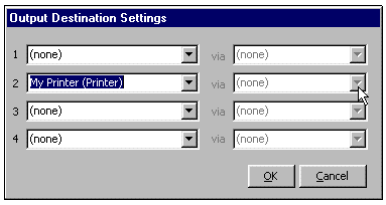
Data Bits should always be set at **8**, Parity should always be set at **None** and Stop Bits should always be set at **1**. The **Flow Control** check box should always be enabled ☑.

7. We now need to select the type of record to be printed.



Select Output Destinations

Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> Output Destinations**.

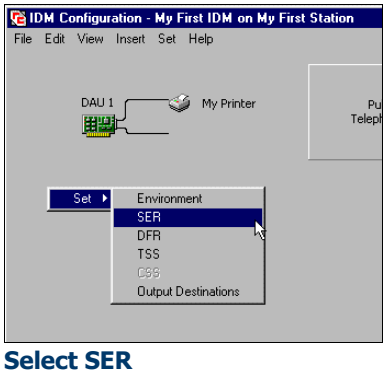


Specify Printer Output Destination

8. From the dialog box shown, use the drop-down lists to specify which output destination to assign to the printer.

Note:
Output destination **1** is not available for printing.

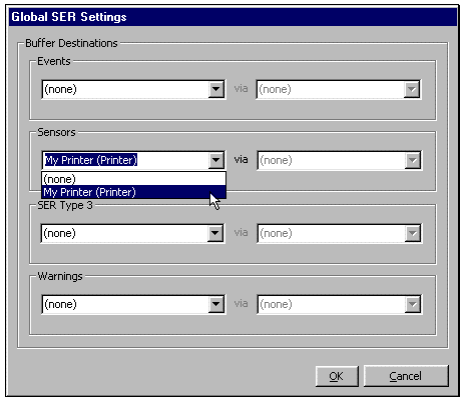
For SER Records



Select SER

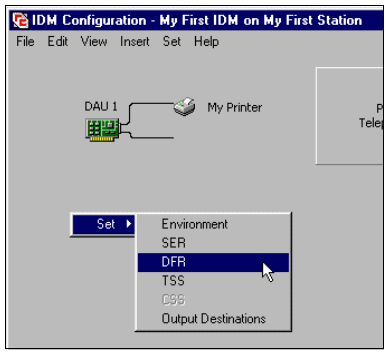
9. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> SER**.

10. Use the drop-down lists to specify the type of SER text string to be printed.



Specify Type of SER Record to be Printed

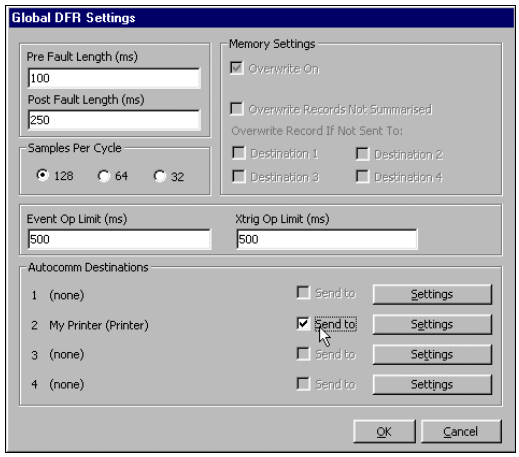
For DFR Records



Select DFR

11. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> DFR**.

12. Enable the **Send to** check box to allow DFR records to be automatically printed.



Enable Autocomms of DFR Records to a Printer

Note:
Qualitrol Hathaway cable **16-1943** is used to connect a dot matrix printer directly to the DAU serial port. Refer to Installation, Connecting Peripherals, for more details.

This completes the hardware definition part of the IDM configuration.

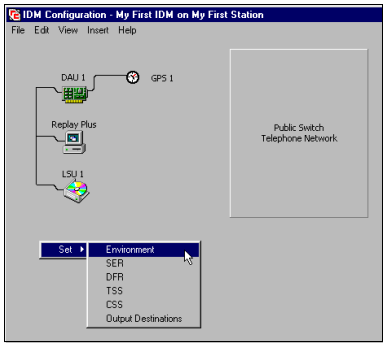
IDM Configuration

IDM Configuration Overview

The next part of the configuration involves entering some configuration information that is common to the complete installation and to all the functions within the IDM.

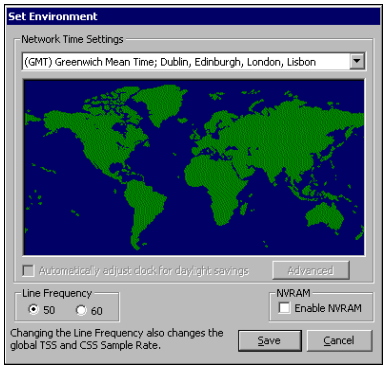
Global Settings - Environment

To specify environment global settings:



Global Settings Menu

1. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> Environment**



Set Environment Details

2. This dialog is used to specify the time zone in which the equipment is to be used, the nominal power system line frequency and to enable NVRAM support if required.

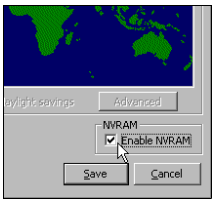
Note:
If the IDM DAU is a "time slave" being synchronised by a "time master" and the time master IDM DAU uses IRIG-B, then the time zone for the time slave must be set to Greenwich Mean Time.

It is also worth mentioning at this point that the Time Zone in the **Windows Date/Time Properties** dialog should also be set to the correct time zone. This dialog can be accessed by double clicking on the clock in the Windows Desktop Taskbar.

About NVRAM Support

With an appropriate version of IDM DAU firmware and correct configuration, an IDM DAU will store DFR, or TSS ,or both DFR and TSS records to non-volatile RAM.

The IDM DAU automatically maintains the non-volatile RAM, with the oldest records being automatically deleted as new records are stored into the non-volatile RAM.



Enabling NVRAM

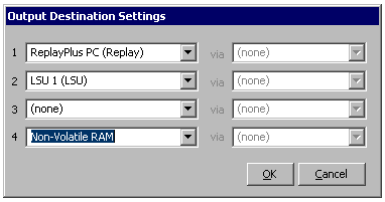
Non -volatile support is optional and may or not be used as required. To enable non-volatile support, enable the **Enable NVRAM** check box ☑ on the Set Environment dialog.

Once enabled, a DAU may be configured to send DFR and TSS records to the non-volatile RAM by selecting **Non-Volatile RAM** as an Output Destination (see below).

Global Settings - Output Destinations

To specify output destinations global settings:

1. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set ->Output Destinations**



Set Output Destinations

2. Use the drop-down lists numbered 1-4 to specify the storage devices

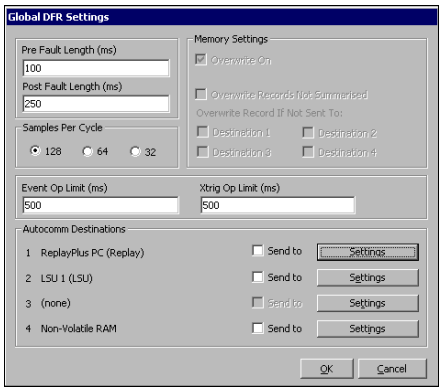
Replay™ Plus PCs, LSUs or non-volatile RAM can be used as destinations where the IDM DAU can automatically transfer records.

Note:
If records are to be transferred to the remote Master Station then the modem to be used must also be specified in the right-hand drop-down list.

Global Settings - DFR

To specify DFR global settings:

1. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> DFR**

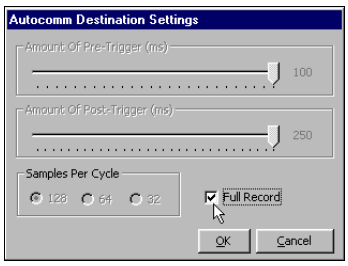


Set DFR Settings

2. This dialog box is used to specify record pre-fault and post-fault time, the sample rate of the stored record, Op limits for event triggers and cross triggers and to enable autocomms of records to selected destinations.

Note:
For more information on setting record lengths and OP limits refer to Appendix C.

3. To enable autocomms of DFR records to a given destination enable the **Send to** check box. To select which portion of a record is sent to a selected output destination click on the **Settings** button.



Set Autocomm Destination Settings

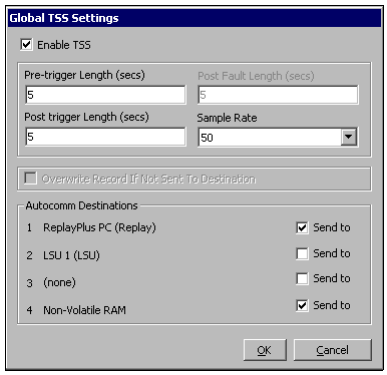
4. Records can be transferred at effective sample rates of 128, 64 or 32 samples per cycle.

5. The data transfer can be restricted to selected portions of the pre-trigger and post-trigger data using the slide controls. To transfer the complete record enable the **Full Record** check box.

Global Settings - TSS

To specify TSS global settings:

1. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> TSS**



Set Global TSS Settings

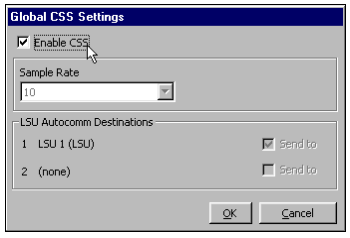
2. Using this dialog the TSS function is enabled or disabled and the sample rate can be selected between 10Hz or 12 Hz and 50Hz or 60 Hz.

3. The pre-trigger length can be set in the range 5 - 600 seconds and the post-trigger length can be set in the range 5 - 600 seconds. To enable autocomms of TSS records to a given destination enable the **Send to** check box.

Global Settings - CSS

To specify CSS global settings:

1. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> CSS**



Set Global CSS Settings

2. This dialog is used to enable the CSS function and select the LSU as the output destination.

Global Settings - SER

To specify SER global settings:

1. Right-click in the bottom portion of the IDM Configuration dialog and from the menu select **Set -> SER**

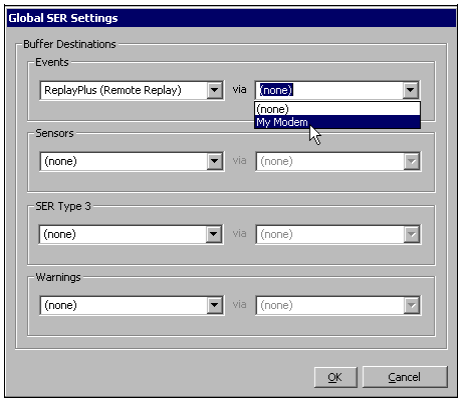
2. If a LSU is configured as available, then SERs are automatically sent to this LSU and the following dialog will be displayed.

LSU Present

3. No further selections are available for SERs if there is a LSU present.

4. If no LSU is present in the configuration, SERs may be sent to a defined output destination.

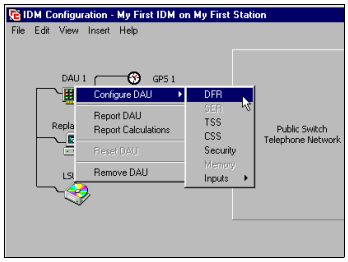
5. Use the drop-down lists in the dialog to select the output destination for each type of SER available. Were the selected output destination is to be accessed using a modem, again select the modem using the drop-down list.



Set Global SER Settings

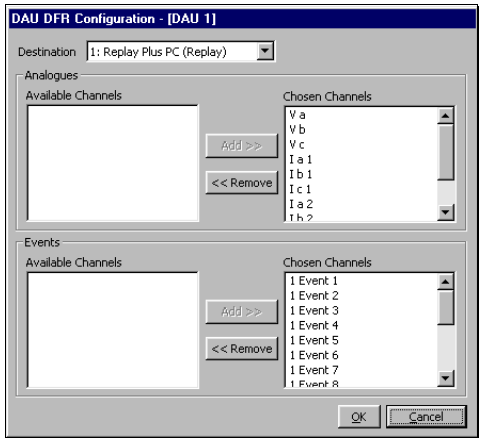
DAU Configuration - DFR

To select this option:



Configuring DAU -> DFR

1. Right-click on the DAU icon and from the menu select **Configure DAU -> DFR**



DAU DFR Configuration

2. This dialog allows the selection of which analog and event channels are to be included in DFR records sent to each destination. Use the Destination drop-down list to select the destination to be configured and channels to be included can be moved to and from the Chosen Channels list using the **Add>>** and **<<Remove** buttons. The default condition is to include all analog and event channels in each output destination.

Note:
When retrieving DFR records with *Replay™ Plus*, either manually or using the polling software, then the configuration for output destination 1 will be used to select which event and analog channels are to be included in the record.

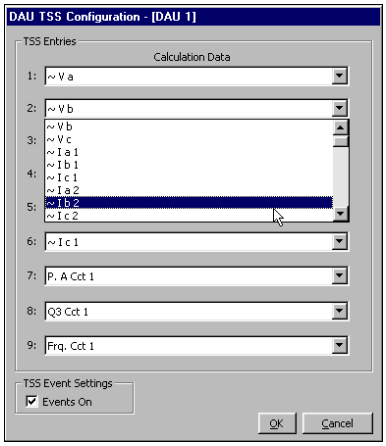
DAU Configuration - TSS

About TSS

The TSS Triggered Slow Scan function, when enabled, is triggered by the same sensors that trigger the DFR function and it records up to nine channels of data selected from the list of 100 quantities calculated each cycle by the DSP. Records are created at scan rates of 10 Hz and 50 Hz on systems with a line frequency of 50Hz and scan rates of 12 Hz and 60 Hz on systems with a line frequency of 60Hz. Records of up to 10 minutes in length can be created with the pre-trigger and post-trigger times being fully configurable.

To select this option:

1. Right-click on the DAU icon and from the menu select **Configure DAU -> TSS**



DAU TSS Configuration

2. Use the nine combo boxes to select which signals are to be recorded in each of the nine channels and enable the **Events On** checkbox to record the event channels in the slow scan record.

Note:
For a complete list of the quantities calculated by the DSP that can be recorded by the TSS and CSS functions refer to Appendix B.

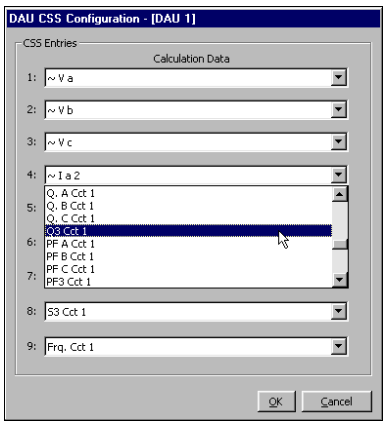
DAU Configuration - CSS

About CSS

The CSS Continuous Slow Scan function, like the TSS function, records up to nine channels of data calculated by the DSP. However in the CSS function, instead of being triggered, the records are continuously stored creating a history of 15 days worth of data on the LSU. Required sections of this data can be retrieved remotely using the *Replay™ Plus* Master Station.

To configure this option:

1. Right-click on the DAU icon and from the menu select **Configure DAU -> CSS**



DAU CSS Configuration

2. Use the nine combo boxes to select which signals are to be recorded in each of the nine channels.

Note:
The CSS function is only available when an LSU is included as part of the IDM installation.

Configure Analog Channels

Having defined all the hardware that is part of the IDM installation we must now configure the equipment and we will start with the analog inputs.

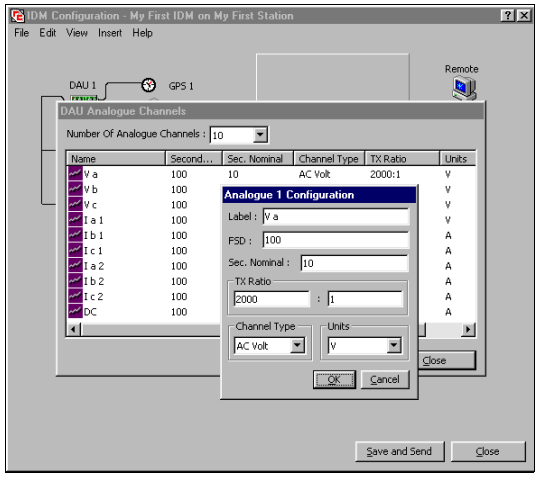
To configure the analog channels:

1. Right click on the DAU icon and select **Configure DAU -> Inputs -> Analogs**

2. First select the number of analog channels that the DAU is equipped with; 10 or 16.

Caution!
Be sure to make the correct selection here as all data entered later will be lost if you have to change this field.

3. To enter details for one of the analog channels double-click on an entry in the List View.



Analog Channel Configuration

Each analog channel can be configured with changes to the following fields:

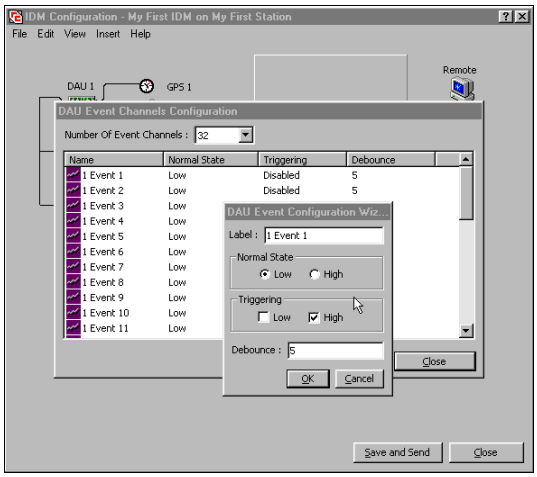
- The channel **Label**.
- The channel full scale (the **FSD** field) cannot be changed -it is part of the calibration data stored in flash memory in the DAU and is the full scale of the analog input.

- The secondary **Nominal value** of the analog channel (e.g. 1A or 63.5V).
- The primary (transformer) **TX Ratio** (e.g. 2000:5)
- The **Channel Type** field defines the channel type and is normally set AC volts or AC current.
- The **Units** field is the units used to calibrate the analog input, normally V or A.

Configure Event Channels

To configure the event channels:

1. Right click on the DAU icon and select **Configure DAU -> Inputs -> Events**



Event Channel Configuration

2. First select the number of event channels that the DAU is equipped with.

Caution!
Be sure to make the correct selection here as all data entered later will be lost if you have to change this field.

3. To enter details for one of the event channels double-click on an entry in the List View.

Each event channel can be configured with changes to the following fields:

- The channel **Label**.
- Select the **Normal State** for the event input.
- Select the edges on which transitions should cause a trigger; **Low, High** (or both).
- Select a **Debounce** time in the range 0 - 10 ms. A trigger condition will only occur when an event input remains in a triggered state for a period longer than the de-bounce time.

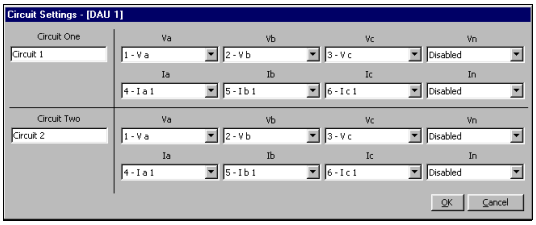
Configure Circuits

About Circuits

To permit the DSP processor to calculate three phase quantities such as real and reactive power and sequence components it must be configured with the definitions of the three phase voltage and current inputs for each circuit being monitored.

To configure the circuits:

1. Right click on the DAU icon and select **Configure DAU -> Inputs -> Circuits**



Enter Circuit Settings

2. Type a circuit name for each circuit and select the analog channels that record the three phase voltage and current signals for each circuit. In many cases the voltage signals will be shared between multiple circuits. The neutral current and voltage channels I_n and V_n are not currently used but are included for future expansion.

3. The rms calculations for each of the analog inputs are calculated by default and do not require this configuration.

Report DAU and Report Calculations

Having completed the IDM configuration we must now retrieve the DAU calibration information so that it can be merged with the configuration data. This permits the *Replay™ Plus* software to derive the scaling of the calculated quantities generated by the DSP processor on the DAU at run time and include it as part of the configuration.

To retrieve the DAU calibration information:

1. Right-click on the DAU icon and select **Report DAU**; *Replay™ Plus* now retrieves and displays the calibration information for the DAU analog channels.

2. Click **Save** to add this to the configuration. To display the scaling for the DSP calculated quantities right-click on the DAU icon and select **Report Calculation**

Note:
When changes are made to the DAU calibration or configuration items that effect channel scaling (e.g. transformer ratios) then new calibration information must be retrieved from the DAU using Report DAU. *Replay™ Plus* will automatically merge it with the new configuration and it must be sent back to the DAU.

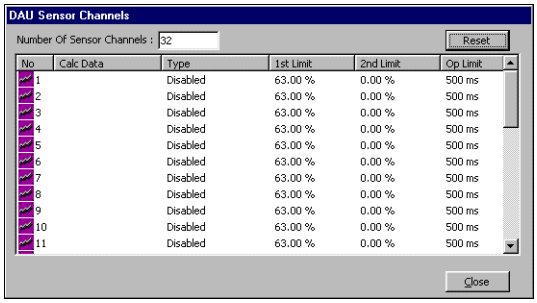
Configure Sensors

About Sensors

Sensors, or analog triggers, are used to trigger the DFR and TSS functions within the IDM. Each DAU can be configured with up to 32 software sensors that will operate on any of the 100 quantities calculated by the DSP processor. There are two main types of sensor; level and rate of change. Each level sensor can have two threshold levels which allow it to be used as a window sensor. Each rate of change sensor may be configured with a different rate of change setting for rising and falling signals. The setting for the falling edge should be a negative number. Sensors can be configured to operate on any of the 100 quantities calculated within the DAU by the DSP processor. The complete list of calculated quantities is displayed in the Select Sensor Calculation dialog.

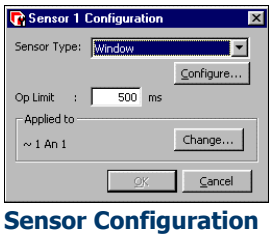
To configure the sensors:

1. Right click on the DAU icon and select **Configure DAU -> Inputs -> Sensors**


DAU Sensor Channels
Number Of Sensor Channels : 32
Reset
No
Calc Data
Type
1st Limit
2nd Limit
Op Limit
1 Disabled 63.00 % 0.00 % 500 ms
2 Disabled 63.00 % 0.00 % 500 ms
3 Disabled 63.00 % 0.00 % 500 ms
4 Disabled 63.00 % 0.00 % 500 ms
5 Disabled 63.00 % 0.00 % 500 ms
6 Disabled 63.00 % 0.00 % 500 ms
7 Disabled 63.00 % 0.00 % 500 ms
8 Disabled 63.00 % 0.00 % 500 ms
9 Disabled 63.00 % 0.00 % 500 ms
10 Disabled 63.00 % 0.00 % 500 ms
11 Disabled 63.00 % 0.00 % 500 ms
Close

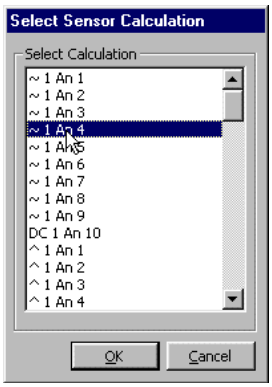
DAU Sensor Channels List

The DAU Sensor Channels dialog contains a summary list of the 32 sensors available in each DAU. The list contains the Sensor No, the calculated quantity that the sensor will operate on, the sensor Type, the threshold settings and the OP Limit time.



Sensor Configuration

2. To edit sensor settings double-click on a sensor number to open the Sensor Configuration dialog.

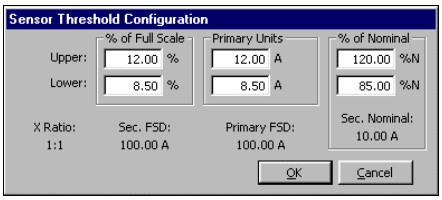


Select a Sensor Calculation

3. Select a sensor type to allow the sensor to be applied to a signal. Now click on **Change...** to select a signal in the Select Sensor Calculation dialog. After the signal has been selected, ensure the sensor type is correct for this signal. Sensors available include, Over Value, Under Value, R.O.C. (rate of change) and Window.

Note:
For a complete list of available calculated quantities refer to Appendix B - DSP Calculations.
For details of the how the sensor OP Limit setting controls the record length refer to Appendix C DFR Record lengths and Sensor OP Limits.
If the calculation that the sensor is to be applied to is Frequency the types of sensor available are Frequency Over, Under, Window and Rate of Change.

4. Now click on **Configure...** and set the threshold.



Set Sensor Threshold Configuration

5. Over and under sensors require one threshold setting, Window sensors require two and R.O.C sensors have different threshold settings for rising and falling signals.

6. Sensor thresholds can be set in primary units, as a percent of the channel full scale, or as a percentage of nominal. When setting trigger levels as a percentage of nominal a value of 120% will trigger at 20% above nominal and a setting of 80% will trigger at 20% below nominal.

7. When setting thresholds with respect to the nominal value ensure that the secondary nominal value has been correctly set for the analog channel on the Analog Channel Configuration dialog.

Example Sensor Configuration - Configure Sensor 7 to be set a Voltage Window Trigger on Channel 2

1. Open the DAU Sensor Channels dialog and double-click on the entry for sensor **7**.

2. In the Sensor Type drop-down list select **Window**.

3. Click on **Change...** and in the Select Sensor Calculation dialog choose the signal from channel **2** and click on **OK**.

4. Click on **Configure...** and enter values in the % of Nominal field to set threshold levels with respect to the nominal value.

5. To set an upper trigger level of 20% above nominal enter 120% in the Upper: % of Nominal threshold text box.

6. To set a lower trigger level of 15% below nominal enter 85% in the Lower: % of Nominal threshold text box.

7. Click **OK** twice, **Close**, then **Save and Send** in the IDM Configuration dialog to send the new configuration to the DAU.

Sending Configuration to the DAU

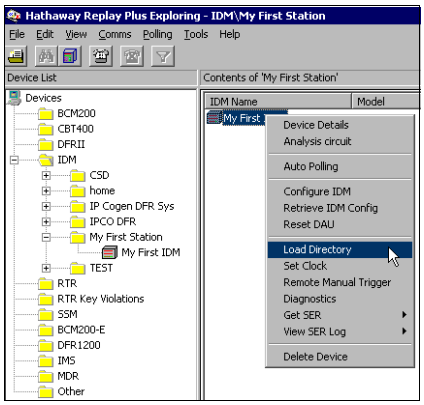
Having completed the configuration the new data must be sent to the DAU. To send the configuration click on **Save and Send**. This creates a binary configuration file and sends it to the DAU using the communication information specified in the Device Details dialog.

Communications

Communications Overview

To access all IDM communications options:

1. Select the **Devices** tab



Selecting Communication Options

2. Right-click on the device name in the right hand List View pane of the *Replay™ Plus* Explorer.

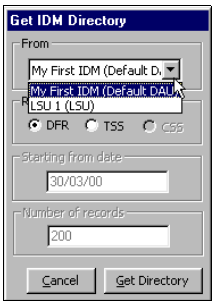
The following communications options are provided.

OPTION	DESCRIPTION
Retrieve IDM Config	Retrieve an IDM configuration and save to the *Replay™ Plus* database
Reset DAU	Reset the remote IDM
Load Directory	Load a DFR, TSS, or CSS directory from the IDM or LSU and optionally select and retrieve record files
Set Clock	Synchronise the IDM real time clock to the *Replay™ Plus* PC clock
Remote Manual Trigger	Trigger the remote IDM
Get SER	Retrieve Sequence of Event Data from the remote IDM

Retrieving IDM Directory and Records

To retrieve the IDM directory and records:

1. Select the **Devices** tab



Get IDM Directory

2. Right-click on the device name and select **Load Directory**
3. Use the From drop-down list to select whether the directory should be retrieved from the DAU or the LSU.
4. Next select whether a DFR, TSS or CSS directory is required.
5. If the directory is from an IDM, click on **Get Directory**. If the directory is from a LSU further options are available. If these default settings are not appropriate, set the Starting from date and specify the Number of records to limit the size of the directory to be retrieved, then click on **Get Directory**
6. For DFR and TSS records when the directory has been displayed highlight the records to be retrieved and click on **Retrieve Now**

CSS Directory

When a CSS Directory has been retrieved it contains a list of segments of CSS data stored in the LSU hard drive.

To retrieve CSS data:

Retrieved CSS Data

1. Select the required data segment from the List View
2. Use the Starting Date/Time drop-down list to select the start date and enter the start time in hours and minutes.

3. Use the Duration box to specify the length of data segment required. The maximum length of a data record that can be retrieved is 90 minutes.

Note:
The CSS data record to be retrieved must be contained within one CSS data segment.

Retrieving Sequence of Event Data

Sequence of Event data is available in three different categories; Events, Sensors and Warnings

To retrieve Sequence of Event data:

1. Select the **Devices** tab

2. Right-click on the device name and select **Get SER -> Events/Sensors/Warnings**

3. When SER data is retrieved from the DAU it is stored in an SER log on the Replay Plus database and this data can be viewed by right-clicking on the device name and selecting **View SER Log -> Events/Sensors/Warnings**

For IDM installations with an LSU all SER data is automatically transferred to the LSU and is retrieved as above.

IDM Polling

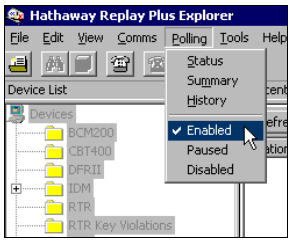
Polling Overview

IDM polling enables *Replay™ Plus* to automatically recover DFR records or TSS records or both record types from IDM DAUs and LSUs.

All polling configuration information is stored in the *Replay™ Plus* database.

Polling is disabled by default and will remain so until enabled by the user.

To Enable Polling



Enabling Polling

1. From the *Replay™ Plus* Explorer window click on **Polling** and then select **Enabled**

2. Polling status, is shown on the *Replay™ Plus* status bar below the Records tab.

Polling Enabled

Caution!
Problems can arise if there are several PCs each running *Replay™ Plus* and all sharing a central database. Each PC will run polling according to the polling configuration defined in the central database. It is envisaged that if this is the case, polling should run on only one PC. This single PC is nominated as the Polling Master.

When polling is enabled, this setting is stored in the registry of the PC. The registry key that contains the polling status is as follows;

HKEY_CURRENT_USER
\Software
\VB and VBA Program Settings
\Task Manager
\Window
\PollState

This key is created when *Replay™ Plus* is closed for the first time.

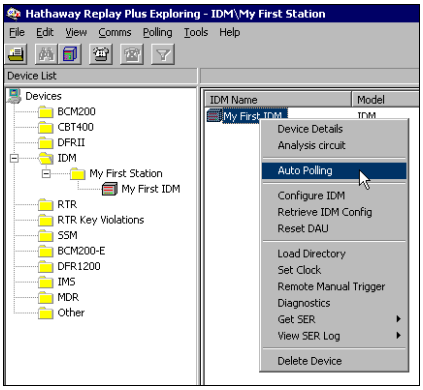
It contains one of the following values:

- 0 - Polling Enabled
- 1 - Polling Paused
- 2 - Polling Disabled

Auto Polling Configuration

To auto poll a specified device:

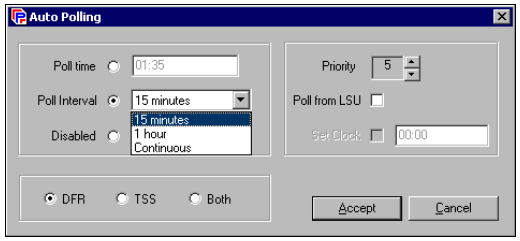
1. Select the **Devices** tab



Auto Polling an IDM Device

2. Right-click on the device name in the right hand List View pane of the *Replay™ Plus* Explorer and select **Auto Polling**

3. This will open a dialog called Auto Polling. Polling will automatically recover new records from an IDM device. Polling keeps a note of the date and time of the last record recovered from a device via polling and will subsequently recover all records newer than this date and time when next polled.



Set Auto Polling

4. Options are available to select between Poll time, Poll interval and Disabled. (The default option is Disabled.)

5. Select **Poll time** to specify a once per day time for polling. Enter this time in 24 hour format.

6. Alternatively select **Poll Interval** to enable polling as every 15 minutes, once per hour or continuous. Poll sessions will then occur at 15 minute, one hour boundaries or continuous as determined by the clock of the *Replay™ Plus* PC. For dial-up connections, continuous is every 2 minutes.

7. Next, select to poll for DFR records only, TSS records only or both DFR and TSS records.

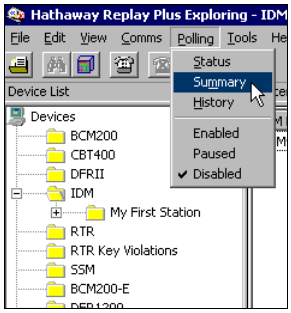
8. Use the **Priority** setting if there are several polling task to be performed at the same time. Those tasks with a higher priority number receive preferential treatment by the polling program (10 indicates highest priority, 1 indicates lowest priority).

9. Enable the **Poll from LSU** check box ☑ to enable polling from a connected LSU.

10. Click on **Accept** when all entries have been made.

Polling Operation

The Polling menu in the *Replay™ Plus* Explorer window gives options to monitor the status and progress of polling.



Polling Menu

These options are:

- Status
- Summary
- History

Status is used to show details of the next poll and any poll that may be presently in progress. Summary shows details of the polling for all devices, listing only the devices for which polling is enabled. History gives an archive of polling activity for all devices for which polling is enabled.

These three options may be viewed as giving polling information based upon "time". So, Status gives the "future" and "present" showing details of the next poll to be carried out along with details of a poll whilst it is actually in progress. When a poll is completed, the details of the poll are accumulated into the Summary. Thus, the Summary gives a review of recent poll activity. History gives an archive record of polling information, listing the individual poll activities for each device.

About IDM Polling Operation

Polling operates by maintaining knowledge of the date and time of the last record successfully recovered from a device via polling. Thereafter, it will recover all records newer than this date andime when the device is next polled.

If a situation develops whereby old records were not successfully recovered by polling but a newer record was (most likely because of a communications problem) then polling will not automatically recover these old records.

During certain times (specifically when polling has control of the communications program to carry out polling requests) some normal user selected commands that involve communications will not be allowed.

Polling has priority over operator requests that involve communications to devices. If the user selects a command that requires communications (and consequently would interfere with polling) the following dialog will be displayed.

Polling in Progress

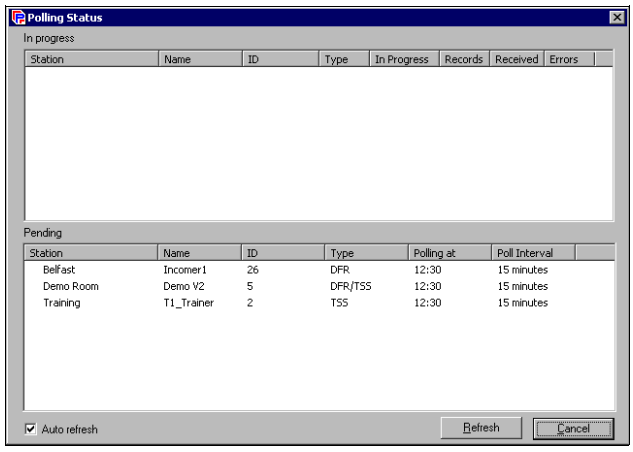
The user may click on **OK** button and wait until later.

Alternatively, choose **Paused** or **Disabled** from the Polling menu to pause or disable polling.

Polling Status - Example

As explained previously, Polling Status gives details of the next polls and any polls that are actually in progress. From the *Replay™ Plus* Explorer window click on **Polling** and then select **Status**

The Polling Status dialog will be displayed.


Polling Status
In progress
Station Name ID Type In Progress Records Received Errors
Pending
Station Name ID Type Polling at Poll Interval
Belfast Incomer1 26 DFR 12:30 15 minutes
Demo Room Demo V2 5 DFR/TSS 12:30 15 minutes
Training T1_Trainer 2 TSS 12:30 15 minutes
Auto refresh
Refresh
Cancel

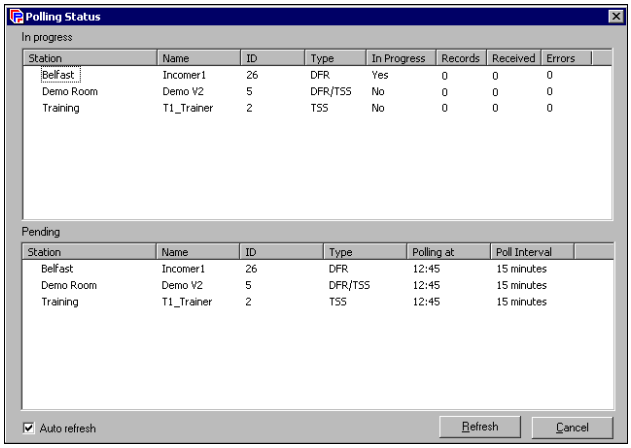
Polling Status #1

The lower section of the dialog **Pending** shows the next poll activity while the upper section **In Progress** shows details of any poll that may be in progress.

In the example shown above, the lower Pending section indicates that polling of three devices is scheduled to take place at 12:30. One of the devices is configured to poll DFR only, one to poll TSS only and one to poll both DFR and TSS.
The blank In progress section indicates that there is no polling activity presently in progress.

The **Auto refresh** check box in this example has been enabled ☑ to allow the information in the dialog to be updated automatically to show the progress of the polling tasks.

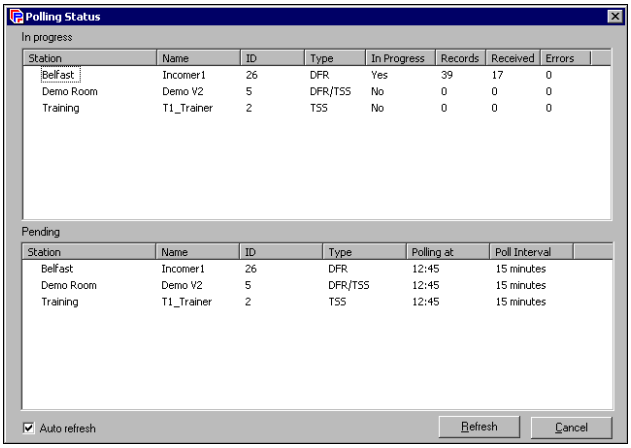
Thus, at 12:30, the lower Pending section of the dialog changes to indicate that the next polling activity will be to three devices at 12:45 (a result of their polling being configured for a 15 minute interval).


Polling Status
In progress
Station Name ID Type In Progress Records Received Errors
Belfast Incomer1 26 DFR Yes 0 0 0
Demo Room Demo V2 5 DFR/TSS No 0 0 0
Training T1_Trainer 2 TSS No 0 0 0
Pending
Station Name ID Type Polling at Poll Interval
Belfast Incomer1 26 DFR 12:45 15 minutes
Demo Room Demo V2 5 DFR/TSS 12:45 15 minutes
Training T1_Trainer 2 TSS 12:45 15 minutes
Auto refresh
Refresh
Cancel

Polling Status #2

The upper In progress section of the dialog now indicates the status of the actual polling that is now in progress. Three devices are to be polled and the first of these is actually being polled at this particular instant in time (shown by the Yes indication in the In Progress column).

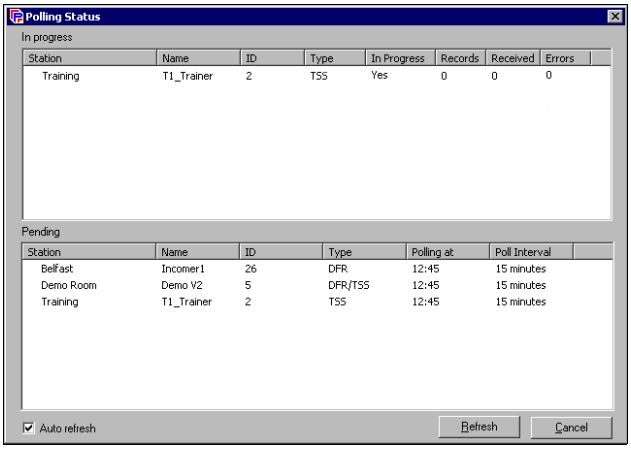
As polling continues, devices which have been polled are removed from the upper In progress section and the In Progress column becomes Yes for the next device in the list, indicating that this is the device being polled at this instant.


Polling Status
In progress
Station Name ID Type In Progress Records Received Errors
Belfast Incomer1 26 DFR Yes 39 17 0
Demo Room Demo V2 5 DFR/TSS No 0 0 0
Training T1_Trainer 2 TSS No 0 0 0
Pending
Station Name ID Type Polling at Poll Interval
Belfast Incomer1 26 DFR 12:45 15 minutes
Demo Room Demo V2 5 DFR/TSS 12:45 15 minutes
Training T1_Trainer 2 TSS 12:45 15 minutes
Auto refresh
Refresh
Cancel

Polling Status #3

As polling progresses further, the Records and Received columns indicate how may records polling is recovering from the device.

Polling continues in this way, with devices which have been polled being removed from the In progress section and the In Progress column becoming Yes for the next device to be polled.


Polling Status
In progress
Station Name ID Type In Progress Records Received Errors
Training T1_Trainer 2 TSS Yes 0 0 0
Pending
Station Name ID Type Polling at Poll Interval
Belfast Incomer1 26 DFR 12:45 15 minutes
Demo Room Demo V2 5 DFR/TSS 12:45 15 minutes
Training T1_Trainer 2 TSS 12:45 15 minutes
Auto refresh
Refresh
Cancel

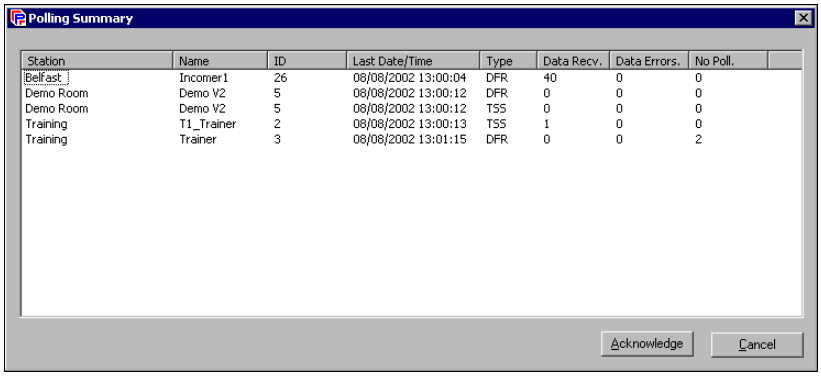
Polling Status #4

Again, as polling continues, the Records and Received columns indicate how may records polling is recovering from the device.

Polling Summary - Example

As explained previously, Polling Summary gives an overview of the polling for all devices for which polling is enabled. From the *Replay™ Plus* Explorer window click on **Polling** and then select **Summary**

The Polling Summary dialog will be displayed.



Polling Summary

The dialog lists all devices for which polling is enabled, along with the time of the most recent poll carried out on the device.

The Data Recv. column is a cumulative count of the records that have been recovered from the device by polling since last Acknowledged by the user.

The Data Errors column is a cumulative count of the number of data errors that have occurred. During normal operation this will essentially be the number of records during which a communications error was encountered.

The No Poll column is a cumulative count of the number of times a directory was not obtained from the device being polled. This may be a consequence of, for example, a modem problem.

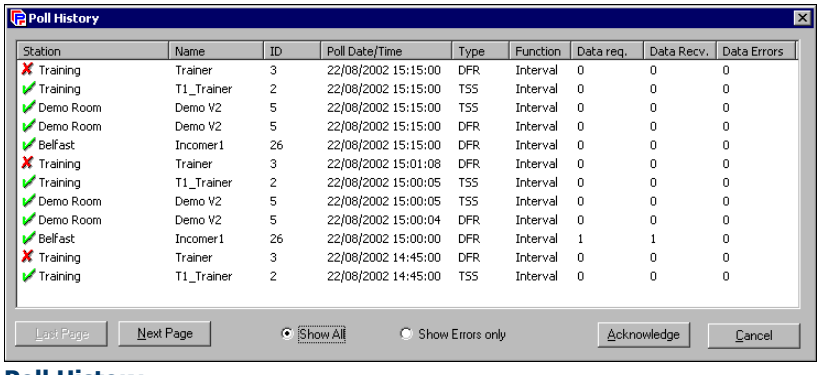
Clicking the **Acknowledge** button clears the Polling Summary.

Polling History - Example

As explained previously, Polling History gives an archive of the polling activity, per polling request, for all devices for which polling is enabled.

From the *Replay™ Plus* Explorer window click on **Polling** and then select **History**

The Poll History dialog will be displayed.


Poll History
Station
Name
ID
Poll Date/Time
Type
Function
Data req.
Data Recv.
Data Errors
Training Trainer 3 22/08/2002 15:15:00 DFR Interval 0 0 0
Training T1_Trainer 2 22/08/2002 15:15:00 TSS Interval 0 0 0
Demo Room Demo V2 5 22/08/2002 15:15:00 TSS Interval 0 0 0
Demo Room Demo V2 5 22/08/2002 15:15:00 DFR Interval 0 0 0
Belfast Incomer1 26 22/08/2002 15:15:00 DFR Interval 0 0 0
Training Trainer 3 22/08/2002 15:01:08 DFR Interval 0 0 0
Training T1_Trainer 2 22/08/2002 15:00:05 TSS Interval 0 0 0
Demo Room Demo V2 5 22/08/2002 15:00:05 TSS Interval 0 0 0
Demo Room Demo V2 5 22/08/2002 15:00:04 DFR Interval 0 0 0
Belfast Incomer1 26 22/08/2002 15:00:00 DFR Interval 1 1 0
Training Trainer 3 22/08/2002 14:45:00 DFR Interval 0 0 0
Training T1_Trainer 2 22/08/2002 14:45:00 TSS Interval 0 0 0
Last Page
Next Page
Show All
Show Errors only
Acknowledge
Cancel

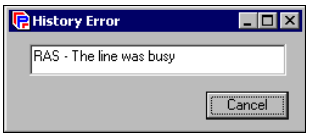
Poll History

The poll history is displayed one page at a time.

The **Next Page** and **Last Page** buttons are used to navigate through the history.

Use the **Show All** option to show all poll history.

Use **Show Errors only** to view only the poll history that failed.



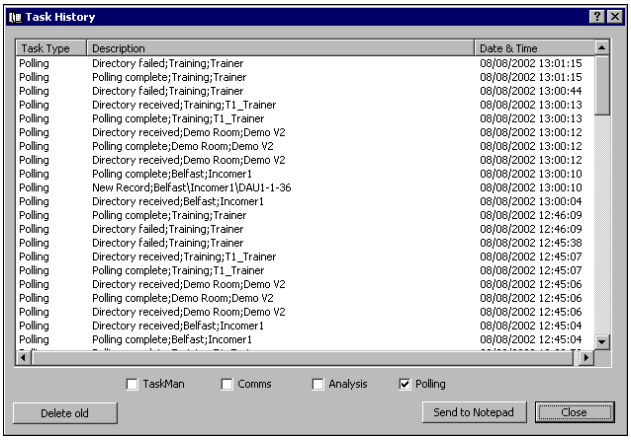
History Error

To view specific errors, double-click on any error on the list and an explanation of the error will be displayed.

Clicking the **Acknowledge** button clears the Polling History.

Polling - Task History

Additionally, polling activity is recorded in the main *Replay™ Plus* Task History. From the *Replay™ Plus* Explorer window click on **Tools** and then select **View Task History**


Task History
Task Type
Description
Date & Time
Polling Directory Failed;Training;Trainer 08/08/2002 13:01:15
Polling Polling complete;Training;Trainer 08/08/2002 13:01:15
Polling Directory Failed;Training;Trainer 08/08/2002 13:00:44
Polling Directory received;Training;T1_Trainer 08/08/2002 13:00:13
Polling Polling complete;Training;T1_Trainer 08/08/2002 13:00:13
Polling Directory received;Demo Room;Demo V2 08/08/2002 13:00:12
Polling Polling complete;Demo Room;Demo V2 08/08/2002 13:00:12
Polling Directory received;Demo Room;Demo V2 08/08/2002 13:00:12
Polling Polling complete;Belfast;Incomer1 08/08/2002 13:00:10
Polling New Record;Belfast\Incomer1\DAU1-1-36 08/08/2002 13:00:10
Polling Directory received;Belfast;Incomer1 08/08/2002 13:00:04
Polling Polling complete;Training;Trainer 08/08/2002 12:46:09
Polling Directory Failed;Training;Trainer 08/08/2002 12:46:09
Polling Directory Failed;Training;Trainer 08/08/2002 12:45:38
Polling Directory received;Training;T1_Trainer 08/08/2002 12:45:07
Polling Polling complete;Training;T1_Trainer 08/08/2002 12:45:07
Polling Directory received;Demo Room;Demo V2 08/08/2002 12:45:06
Polling Polling complete;Demo Room;Demo V2 08/08/2002 12:45:06
Polling Directory received;Demo Room;Demo V2 08/08/2002 12:45:06
Polling Directory received;Belfast;Incomer1 08/08/2002 12:45:04
Polling Polling complete;Belfast;Incomer1 08/08/2002 12:45:04
TaskMan
Comms
Analysis
Polling
Delete old
Send to Notepad
Close

View Task History

Enable the **Polling** check box ☑ to display the polling activity.

Note:
To reduce the number of history and log entries made if polling is set for **Continuous**, no entry is made if it is determined that there are no records to be recovered for a particular poll session.

Polling History Errors

The red cross ✘ beside an entry in the Poll History would indicate a possible error and would warrant further investigation, unless an explanation was readily available. Typical errors are failure to get a directory and failure to get a record.

Example 1 - Failure to Get a Directory

When both data requested (Data req.) and data received (Data Recv.) are both zero, the most likely cause is that a directory was not obtained from the device.

Station	Idm Name	NetWork ID	Poll Date/Time	Type	Function	Data req.	Data Recv.	Data Erro
✘ Belfast	Incomer2	27	22/05/01 10:37:...	DFR	Manual	0	0	0

Poll History Error

A further examination of the Task History confirms that this is indeed the issue, namely, that polling failed to recover a directory from the device.

Polling	Polling complete...Belfast - Incomer2	22/05/01 10:37:28 AM
Polling	Directory failed...Belfast - Incomer2	22/05/01 10:37:28 AM

Directory Failed Confirmation

Further information to assist the diagnosis may be available in the COMTRACE window.

```
5/22/2001 10:37:03 AM: Job 1: Sending command 'Get DFR Directory' to IDM Incomer2 Net 27 at station Belfast. (IP 194.1.1.1 - DAUID 0)
5/22/2001 10:37:24 AM: Job 1: TCP/IP error 'Socket error: 10065'  at station Belfast, recorder Incomer2. (IP 194.1.1.1)
5/22/2001 10:37:24 AM: Job 1: IDM Command Failed.
```

COMTRACE Window

Example 2 - Failure to Get a Record

When data requested (Data req.) is a greater number than data received (Data Recv.) the most likely cause is that records were not obtained from a device.

Station	Idm Name	NetWork ID	Poll Date/Time	Type	Function	Data req.	Data Recv.	Data Erro
✘ Belfast	Incomer1	26	22/05/01 11:11:...	TSS	Manual	24	13	11
✘ Belfast	Incomer1	26	22/05/01 11:11:...	DFR	Manual	32	19	13

Poll History Error

A further examination of the Task History confirms that this is indeed the issue, namely, that polling failed to recover records from the device.

Polling	Record failed...Belfast - Incomer1	22/05/01 11:14:15 AM
Polling	Record failed...Belfast - Incomer1	22/05/01 11:14:15 AM
Comms	Data transfer failed due to a file error	22/05/01 11:13:42 AM
Polling	Directory received...Belfast - Incomer1	22/05/01 11:11:53 AM

Record Failed Confirmation

Further information to assist the diagnosis may be available in the COMTRACE dialog.

```
5/22/2001 11:13:43 AM: Job 39: Sending command 'Get DFR Record' to IDM Incomer1 Net 26 at station Belfast. (IP 194.168.175.36 - DAUID 0)
5/22/2001 11:13:43 AM: Job 39: TCP/IP error 'Socket error: 10065'  at station Belfast, recorder Incomer1. (IP 194.168.175.36)
5/22/2001 11:13:43 AM: Job 39: IDM Command Failed.
```

COMTRACE Window

In both these particular examples, there is an obvious problem with communications to the specified device not being established correctly.

Polling History Errors - Record Retry

Where poll errors have resulted in some records not being recovered from devices, details of the particular records and devices involved are stored in a database table.

During the next polling session, the specific records that were "missed" the first time round, will be requested again from the appropriate devices.

There are a total of three retries for such records, and after three failed attempts no further attempts are made by Polling to recover such records.

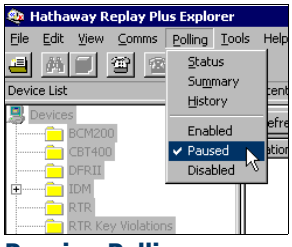
A new poll session will recover previously "missed" records, and any additional new records that may have been recorded since the last poll session.

Pausing and Disabling Polling

Polling has three states - Enabled, Paused and Disabled.

To Pause Polling

1. From the *Replay*™ *Plus* Explorer window click on **Polling** and then select **Paused**



Pausing Polling

2. The paused polling status, is shown on the *Replay*™ *Plus* status bar below the Records tab.

Polling Paused

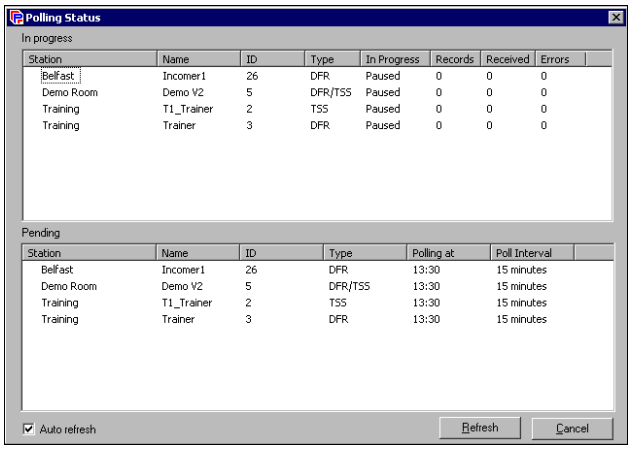
3. Pausing polling will pause all future polling jobs.

Note:
Any poll activity already started (i.e, polling requests shown in the upper **In progress** section of the Polling Status dialog) will be allowed to continue and complete.

Polling will continue to check device configurations and if a poll time is detected, polling requests will be added to a poll queue. However, whilst polling is paused, poll requests will not be processed to actually recover records from devices.

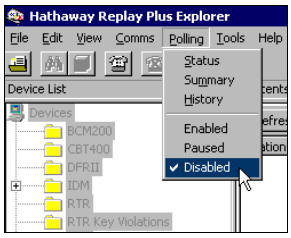
Polling will stay paused for a user defined time (see "Polling - Replay Settings" later in this section for more details). Once this time expires polling will return to the Enabled state.

Such a situation is indicated in the Polling Status dialog, by the In Progress column. This will display Paused, as shown below.


Polling Status
In progress
Station Name ID Type In Progress Records Received Errors
Belfast Incomer1 26 DFR Paused 0 0 0
Demo Room Demo V2 5 DFR/TSS Paused 0 0 0
Training T1_Trainer 2 TSS Paused 0 0 0
Training Trainer 3 DFR Paused 0 0 0
Pending
Station Name ID Type Polling at Poll Interval
Belfast Incomer1 26 DFR 13:30 15 minutes
Demo Room Demo V2 5 DFR/TSS 13:30 15 minutes
Training T1_Trainer 2 TSS 13:30 15 minutes
Training Trainer 3 DFR 13:30 15 minutes
Auto refresh
Refresh
Cancel
Polling Status - Paused

To restart polling that has been paused, from the *Replay™ Plus* Explorer window click on **Polling** and then select **Enabled**

To Disable Polling



Disabling Polling

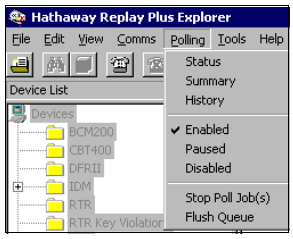
1. From the *Replay™ Plus* Explorer window click on **Polling** and then select **Disabled**
2. The disabled polling status, is shown on the *Replay™ Plus* status bar below the Records tab.

Polling Disabled

Caution!
Clicking on Disabled will stop the polling engine and all jobs in the **In Progress** queue are lost.

Stop Poll Job(s), Flush Queue

When a poll job is in progress, two new items appear in the Polling menu - Stop Poll Job(s) and Flush Queue.



Stop Poll Job(s), Flush Queue

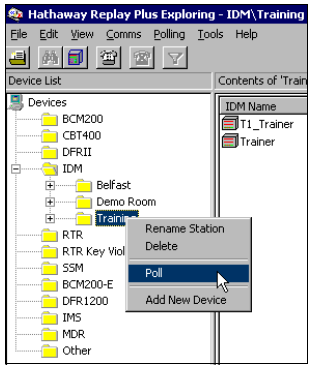
Clicking **Stop Poll Job(s)** will terminate the current poll.

Any poll activity already started (actual communications to the device is in progress) will be allowed to continue and complete.

Clicking **Flush Queue** will remove all pending jobs from the In Progess queue.

Poll Now (Manual Poll)

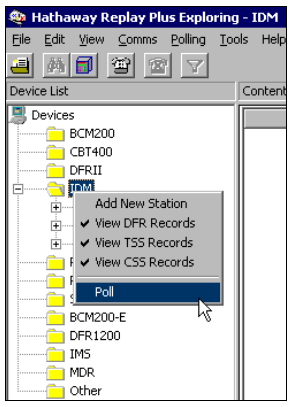
A Poll Now facility is available allowing immediate polling of specified units as defined by the user. To do this:



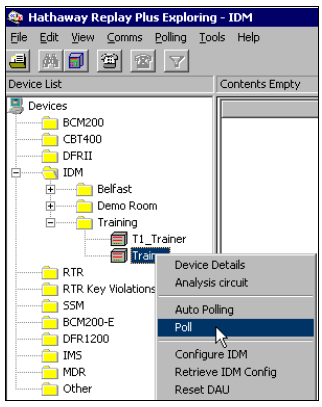
Poll Now - Station

1. Select the **Devices** tab

. Right-click on a Station in the Device List and select **Poll**
2. Note, the user can also right-click on **IDM** in the Device List and select **Poll** to display all Stations and devices.
3. Similarly, right-clicking on a single device and selecting **Poll** enables the user to manual poll a single device.



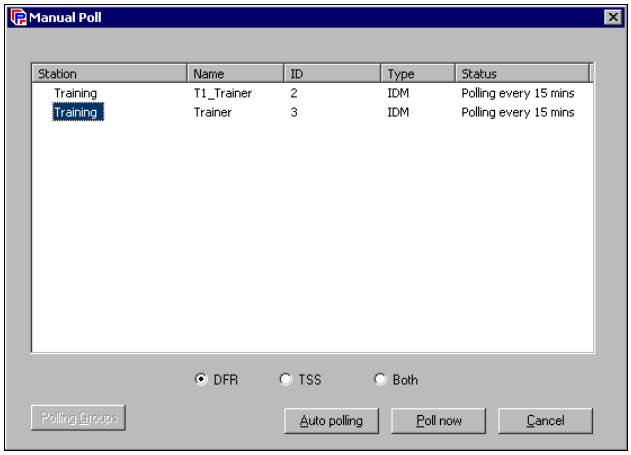
Poll Now - IDM



Poll Now - Device

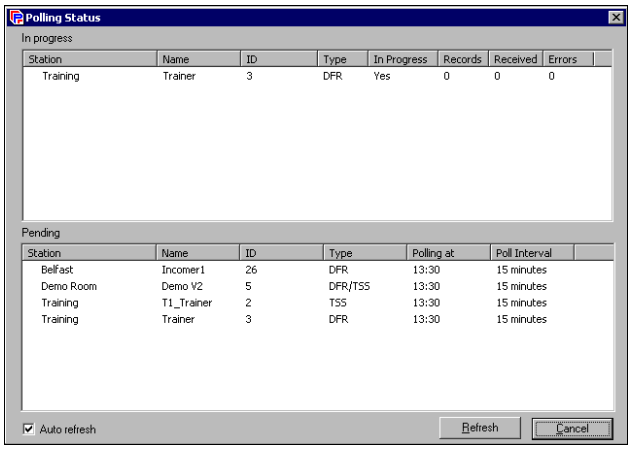
4. A Manual Poll dialog will be displayed, listing all the devices (not just those for which polling is enabled) at that Station.

5. The user may select and highlight multiple devices in the dialog. Choose to poll for DFR records only, TSS records only or both DFR and TSS records and then click the **Poll now** button.



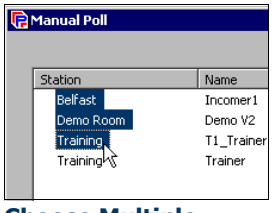
Polling Device "Trainer"

6. Polling of the specified devices will immediately be initiated.



Device "Trainer" Polled

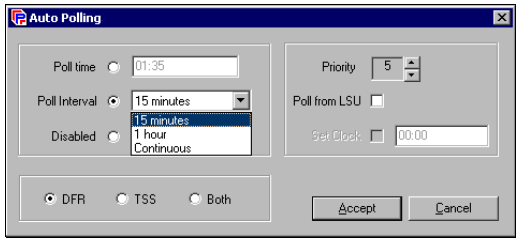
7. The user may also set the auto polling settings for multiple devices at this point.



Choose Multiple Devices

8. Choose the multiple devices in the Manual Poll dialog and click on **Auto polling**

9. The Auto Polling dialog will be displayed.

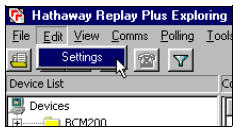


Set Auto Polling for Multiple Devices

10. All changes made in the dialog will then be applied to all the chosen devices. The defaults for the multiple selections are set in the Polling section of the Replay Settings dialog (see next). Also, refer to "Auto Polling Configuration" earlier in this section for more information on Auto Polling.

Replay Settings - Polling

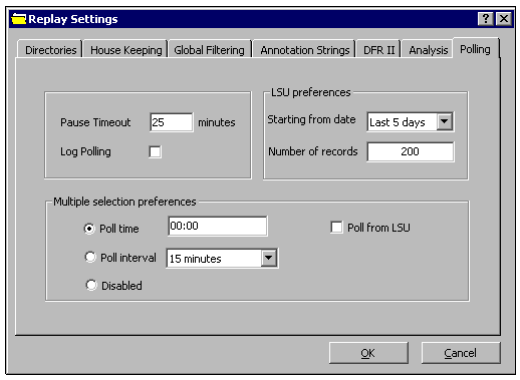
The Replay Settings dialog enables the user to set default polling parameters:



Edit, Settings

1. From the *Replay™ Plus* Explorer window click on **Edit** and then select **Settings**

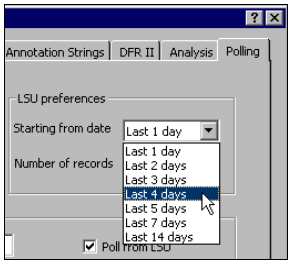
2. This will open a dialog called Replay Settings. Open the **Polling** tab.



Replay Settings - Polling

3. The **Pause Timeout** to the length of time (in minutes) that polling will remain paused.

4. If the **Log Polling** check box is enabled ☑ the polling log will create a log file each hour of all polling activity The log file, named **"PollLogYY_MM_DD_HH.txt"** will be saved in the **..\ReplayPlus** directory.



Set LSU Preferences

5. When polling from an LSU the user can apply restrictions on the records to be recovered. This can either be the maximum **Number of records** or a **Starting from date** (last day) restriction.

   Note that both these restrictions are applied, i.e, only records that meet **both** restrictions will be retrieved.

6. The Multiple selection preferences are the default preferences that are displayed when the user modifies auto polling for multiple devices from the manual poll dialog. See “Poll Now (Manual Poll)” earlier in this section for more details.

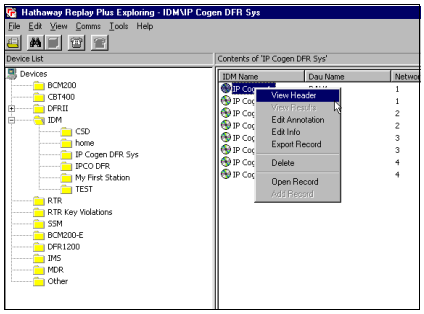
Record Viewer

Record Viewer Overview

To access all record options:

1. Select the **Records** tab

2. Select a Station in the left hand Device List pane. A list of all records in the selected Station will be displayed in the right hand List View pane. Records can be sorted by IDM name, DAU name and date by clicking on the buttons at the top of each column in the List View pane. Click a second time to toggle between an ascending sort and a descending sort.



Selecting Record Options

3. Right-click on the record name in the List View pane of the *Replay*™ *Plus* Explorer.

The following record options are provided.

OPTION	DESCRIPTION
View Header	Displays additional information about the record
Edit Annotation	Editing and display of user notes describing aspects of the record
Edit Info	Add brief notes to the Info field in the List View pane
Export Record	Copy the record file to a destination directory
Delete	Permanently delete the selected record(s) from *Replay*™ *Plus*
Open Record	Opens the record in the Viewer or opens a new record in a new window if viewer is already open
Add Record	Overlays a new record in the current Viewer window

Typical Record Viewer

A typical record viewer window is shown on the following page.

Channel labels and signal values for the two cursor positions are displayed in the left hand pane with the wave forms displayed in the right hand pane. The red Measurement Cursor is positioned by a left click and the blue Reference cursor is positioned using Shift left click.

These options can be reversed by clicking on

Analog channels are auto-scaled for optimum viewing and configuration options permit only active channels (i.e. analog channels with a valid signal or event channels with changes of state) to be displayed.

By default, instantaneous values are displayed at the cursor position.

However, clicking displays rms values for ac signals.

To display active channels only check the **Show only active channels** box in the File -> Preferences menu. Use the **Max. Percentage full scale for noise** setting in the File -> Preferences menu to set the signal level below which the viewer will set analog channels as inactive.

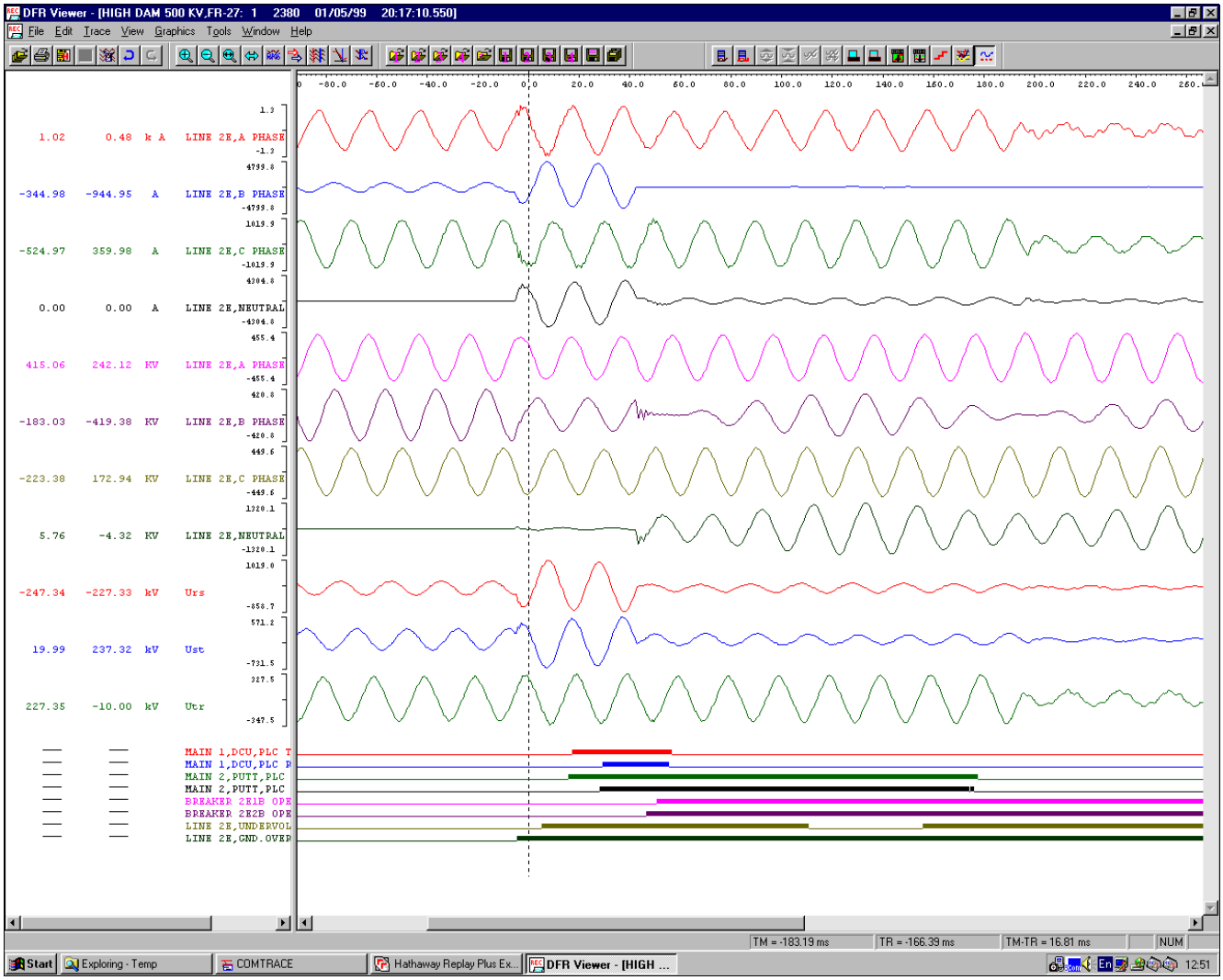
The Trace, Select Analogs menu or the button can be used to over-ride the inactive channel setting or select individual traces for display.

Toolbar buttons and can be used to expand and compress the time axis and the button displays the full time axis.

Clicking on analog channel labels to select a single or multiple channels permits the and buttons to be used to increase or decrease the amplitude scaling of the channels.

The vertical position of analog channels can be changed by clicking and dragging the analog channel label. A *snap* feature automatically aligns the overlayed traces about their horizontal axis.

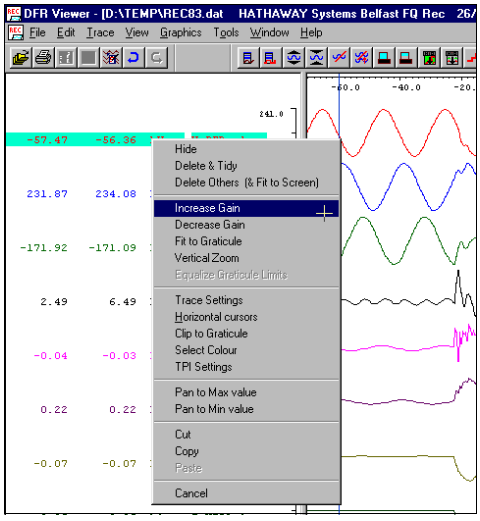
The and buttons can be used to undo and redo changes to the display configuration.


DFR Viewer - [HIGH DAM 500 KV.FR-27: 1 2380 01/05/99 20:17:10.550]
File Edit Trace View Graphics Tools Window Help
1.02 0.48 k A LINE 2E,A PHASE
-344.98 -944.95 A LINE 2E,B PHASE
-524.97 359.98 A LINE 2E,C PHASE
0.00 0.00 A LINE 2E,NEUTRAL
415.06 242.12 KV LINE 2E,A PHASE
-183.03 -419.38 KV LINE 2E,B PHASE
-223.38 172.94 KV LINE 2E,C PHASE
5.76 -4.32 KV LINE 2E,NEUTRAL
-247.34 -227.33 kV Urs
19.99 237.32 kV Ust
227.35 -10.00 kV Utr
MAIN 1,DCU,PLC T
MAIN 1,DCU,PLC P
MAIN 2,PUTT,PLC
MAIN 2,PUTT,PLC
BREAKER 2E1B OPE
BREAKER 2E2B OPE
LINE 2E,UNDERVOL
LINE 2E,GND.OVER
TM = -183.19 ms
TR = -166.39 ms
TM-TR = 16.81 ms
NUM
Start
Exploring - Temp
COMTRACE
Hathaway Replay Plus Ex...
DFR Viewer - [HIGH ...
12:51

Typical Record Viewer Window

Analog Channel Label Menu

Right clicking on an analog channel label displays the Analog Channel Label menu.



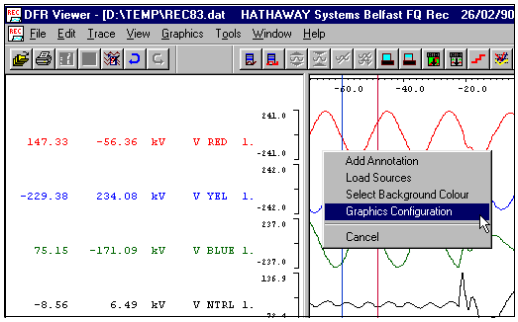
Selecting Analog Channel Label Menu

OPTION	DESCRIPTION
Hide	Hide a trace and leave but do not reformat display
Delete & Tidy	Remove the trace from the display and reformat the display
Delete Others	Delete unselected channels
Increase Gain	Increase signal trace size on all selected channels
Decrease Gain	Decrease signal trace size on all selected channels
Fit to Graticule	Rescale trace size to match graticule
Vertical Zoom	Zoom trace so that area selected by vertical cursors fills the display area

Equalize Graticule Limits	Uses the same trace scaling for all selected channels
Trace Settings	Opens the Trace Settings menu
Horizontal Cursors	Enables horizontal cursors for signal measurement
Clip to Graticule	Only display the signal within the graticule area
Select Colour	Change the colour of the analog channel trace
Cut	Cut a channel from the display
Copy	Copy a channel from the display
Cancel	Close this menu

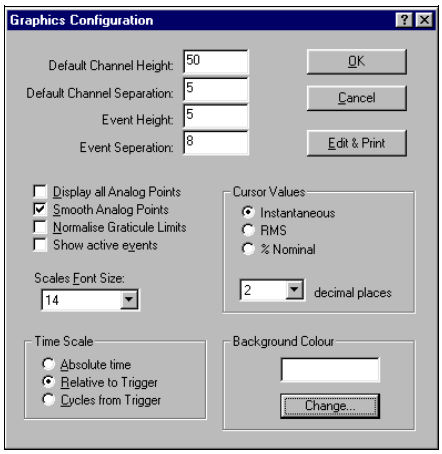
Graphics Configuration

Right click on the right hand graphics pane to display the Graphics Configuration menu.


DFR Viewer - [D:\TEMP\REC83.dat HATHAWAY Systems Belfast FQ Rec 26/02/90
File Edit Trace View Graphics Tools Window Help
147.33 -56.36 kV V RED 1.
-229.38 234.08 kV V YEL 1.
75.15 -171.09 kV V BLUE 1.
-8.56 6.49 kV V NTRL 1.
Add Annotation
Load Sources
Select Background Colour
Graphics Configuration
Cancel

Selecting Graphics Configuration

Select **Graphics Configuration** to display the Graphics Configuration menu.



Graphics Configuration

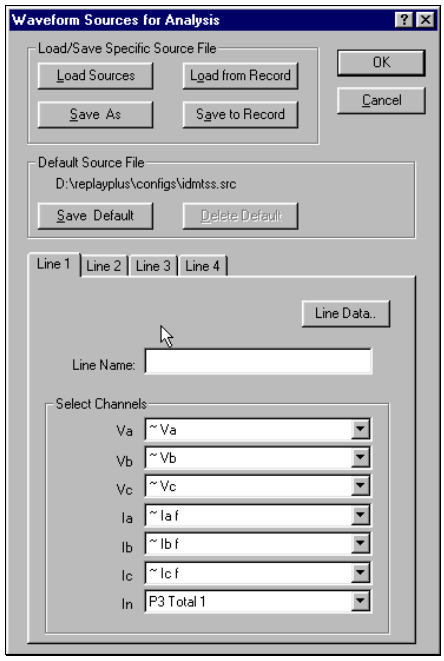
This dialogue can be used to change the graphics background colour, display time values as absolute time and adjust the font and resolution of the cursor values displayed

Advanced Features - Sources

The Record Viewer contains a number of advanced features for the analysis of fault records including Fault Location, Symmetrical Component analysis and the calculation of real and reactive power flow. For these functions to work correctly we need to specify the channels that contain the three phase voltage and current signals for each of the circuits being monitored.

To specify the channels:

1. From the **Tools** menu in the Record Viewer select **Waveform Sources**



Waveform Sources for Analysis

2. Sources can be created for up to four circuits or lines in any one record and each set of sources is enabled by entering a name in the **Line Name** text box.

3. Use the drop-down lists in the Select Channels field to select the channels that contain the three phase voltage and current signals for each circuit or line. The neutral current definition In is only required for the fault location function.

4. The Load Sources and Save As options can be used to save and retrieve Sources definitions from files on disk however it is more convenient to use Display Configurations as a mechanism to save and retrieve Sources information (see Display Configurations section).

Sources are also used by the viewer to ensure that the same scaling factors are applied for each three phase group of voltages and currents to simplify the analysis of records.

Note:
If the Distance To Fault function is to be used then additional data must be entered in the **Line Data** dialog.

Advanced Features - Display Configurations

Having configured the presentation of a record in the viewer it is possible to save the display configuration for later use, in a number of different ways.

- Use the **File -> Graphics Configurations -> Save with Record** to save the current display configuration with the record file so that it is automatically re-used when the file is opened at a later date
- Use the **File -> Graphics Configurations -> Save Named Configuration** or the toolbar button to save the configuration to a user named file.
- Use the and toolbar buttons to save the configuration where it can be recalled using the and buttons.
- Use the **File -> Graphics Configurations -> Save Recorder Default** option to save the current display configuration as the default for the current record type, DFR, TSS, CSS from the current recorder. This option ensures that all new records or each type from each recorder can be pre-assigned a default display configuration.

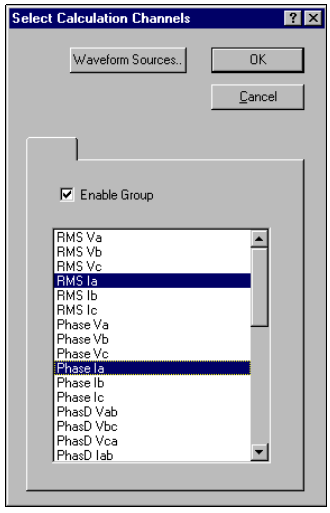
Sources definitions are also stored with display configurations so that they can be automatically assigned to records with the display configuration.

Advanced Features - Calculated Channels

When analysing DFR records the Waveforms function in the software can be used to calculate and plot additional quantities derived from the recorded ac signals. Since most of these calculations use the three phase voltage and current waveforms as inputs to the calculations the Sources options must be configured before this option is enabled.

To access this option:

1. From the **Tools** menu in the Record Viewer select **Select Calc. Channels**



Select Calculation Channels

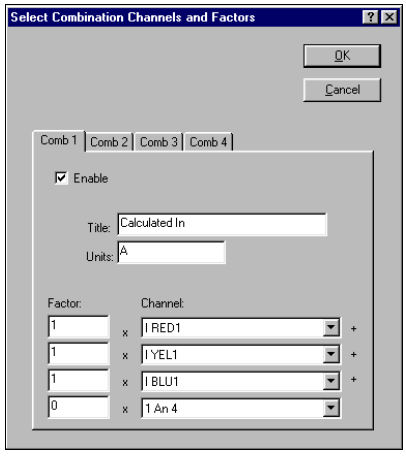
2. Select up to 12 waveforms for display. Available waveforms include rms voltage and current, phase angles, real and reactive power and frequency.

Advanced Features - Combination Channels

The Calculated Waveforms option is used to combine recorded signals to produce a new signal.

To access this option:

1. From the **Tools** menu in the Record Viewer select **Select Comb. Channels**



Select Combination Channels

This example shows how three phase currents are combined to produce a calculated neutral current.

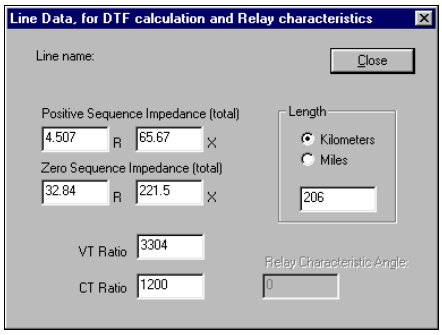
Advanced Features - Distance To Fault Calculation

The *Replay*™ *Plus* software includes a fault location function that can be used to perform impedance based fault location using recorded voltage and current waveforms from fault records. To use the Distance to Fault package the fault record must contain three phase to ground voltage signals and three phase current signals. A neutral current is also required for fault location however if this has not been recorded it can be calculated by adding the three phase currents using the Calculated Channels function described previously.

To configure the Distance to Fault option:

1. Before the Distance to Fault function can be used Sources information must be entered for the faulted circuits. (See Sources described previously).

2. For Distance to Fault calculations additional line data must be added for each circuit by clicking on the **Line Data** button on the Waveforms Sources for Analysis dialog. The data required includes the positive sequence and zero sequence line impedance, the line length and the VT and CT ratios.



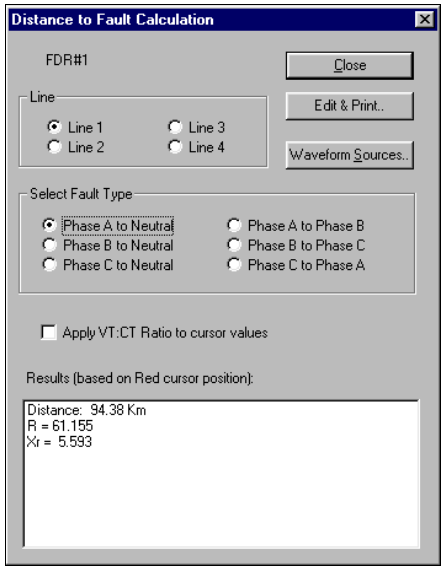
Enter Line Data

3. After entering this data, save the Sources or the Graphics Configuration (which will contain the Sources data), as reloading them in the future will eliminate the need to re-enter the Line Data.

4. The Distance to Fault calculation is performed using one and a half cycles of data around the measurement cursor position. The measurement cursor should be placed in the centre of the most stable portion of the fault.

5. From the **Tools** menu in the Record Viewer select **Distance to Fault**

6. To perform a Distance to Fault calculation select the faulted circuit then select the fault type.



Distance to Fault Calculation

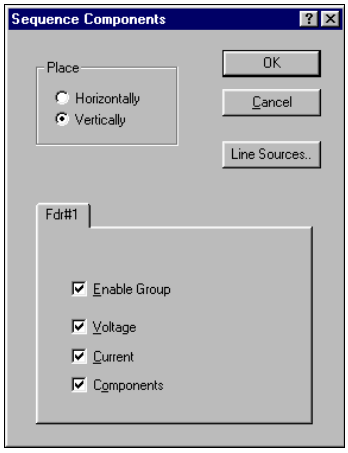
7. If the voltage and current values displayed in the viewer are primary values then the **Apply VT:CT Ratio to cursor values** box should be left unchecked.

Note:
The phasing of the recorded neutral current must be such that for a phase to ground fault, the fault current flowing in the faulted phase is in phase with the recorded neutral circuit. If required, the Calculated Waveforms function can be used to invert the phase of the neutral current by multiplying it by -1.

Advanced Features - Sequence Components

To access this option:

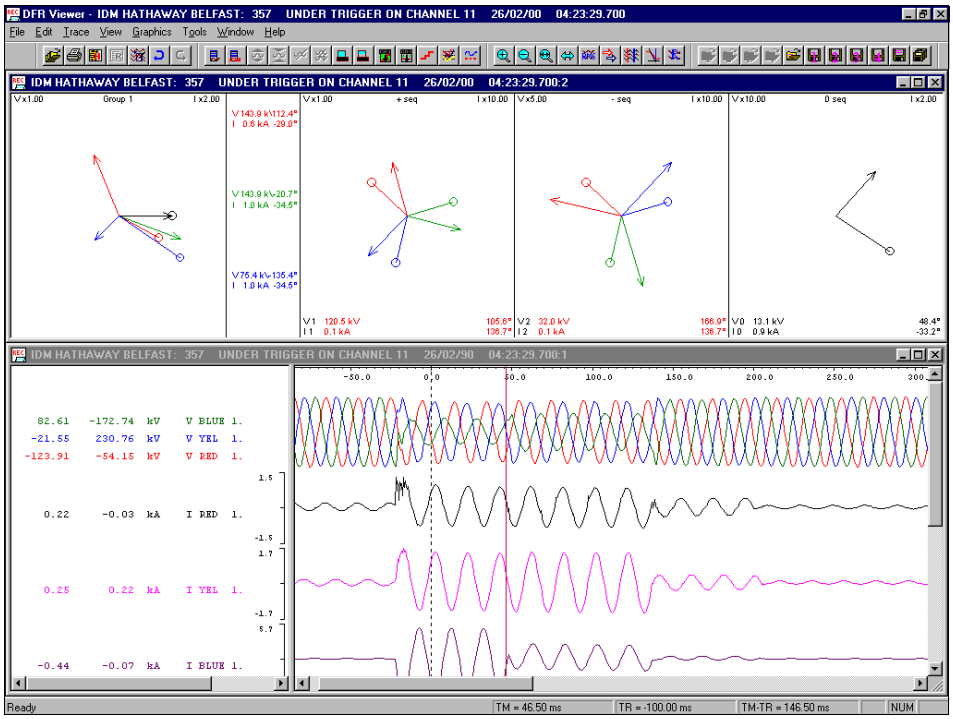
1. From the **Tools** menu in the Record Viewer select **Sequence Components**



Enabling Sequence Components

2. Select which circuit(s) are to be used and then enable the analysis of voltage, current and sequence components as required.

3. Results are displayed in a new window where the voltage phasors have a arrowhead and the current phasors have a circular pointer.


DFR Viewer - IDM HATHAWAY BELFAST: 357 UNDER TRIGGER ON CHANNEL 11 26/02/00 04:23:29.700
File Edit Trace View Graphics Tools Window Help
IDM HATHAWAY BELFAST: 357 UNDER TRIGGER ON CHANNEL 11 26/02/00 04:23:29.700:2
IDM HATHAWAY BELFAST: 357 UNDER TRIGGER ON CHANNEL 11 26/02/00 04:23:29.700:1
Ready

Record Viewer Window with Sequence Components

4. Click on the waveform display. Moving the red cursor will automatically update the phasor velocity.

Advanced Features - Microsoft Excel Export

From the **File** menu in the Record Viewer select **Export Data** to export portions of the fault record to an Microsoft Excel spreadsheet. Data is exported from the selected analog channels from the section between the two cursor positions to a spreadsheet automatically opened in Excel.

Advanced Filtering

Advanced Filtering Overview

This section explains how to apply user-defined filter criteria to records.

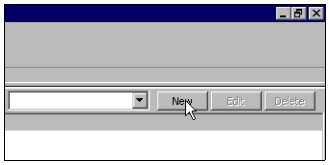
This means that you can choose to display only those records that meet a specified criteria (such as date, station name, etc.).

Note:
Refer to "Using the Filter Display Option" earlier in this chapter for an introduction to the **Filter** tab.

Creating a New Filter

To create a new filter:

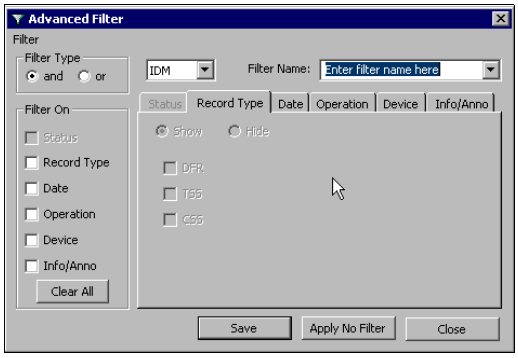
1. From the *Replay*™ *Plus* Explorer window click on **Tools** and then select **Advanced Filtering** or click on on the toolbar.



New Filter

(Alternatively, click on the **New** button. This is displayed in this List View pane while the **Filter** tab is active).

2. This will open a dialog called Advanced Filter.



Advanced Filter - Default Settings

Note:
The Advanced Filter dialog will retain the settings of any previous selected filter when opened, unless the **New** button is clicked, in which case it will be reset to blank defaults.

3. Filtering can be performed on any, or all of five criteria:

- Record Type (DFR, TSS etc.)
- Date and Time
- Operation (manual trigger, event trigger, etc.)
- Device (Station, IDM name)
- Info or Annotation

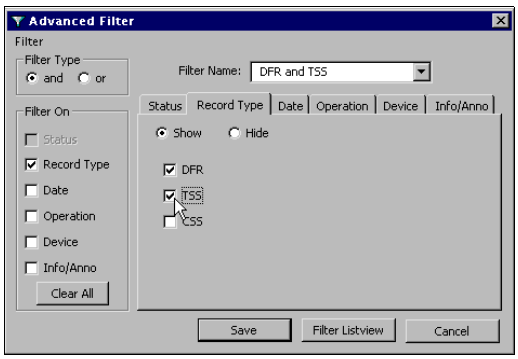
4. The filter criteria is determined by the check boxes in the Filter On field. At least one check box must be enabled for each filter. All five boxes may be selected on the same filter. **Clear All** disables all check boxes ☐.

5. If the Filter Type is set to **and**, records which match all the selected criteria combined will be listed. An **or** Filter Type will list records which match any one (or more) of the selected criteria.

6. Select **Show** to displays records which match the selected criteria or select **Hide** to display records *except* for those which match the selection.

Record Type Filter

Enable the **Record Type** check box ☑.

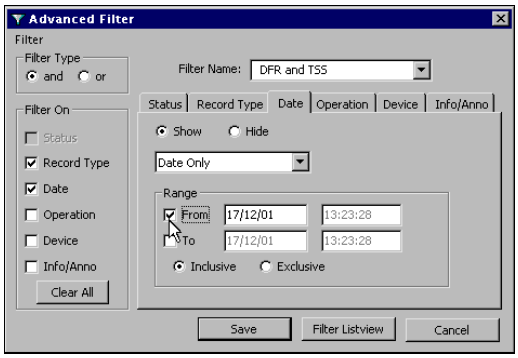


Advanced Filter - Record Type

IDM records will always be either DFR, TSS or CSS. Any or all record types can be selected.

Date and Time Filter

Enable the **Date** check box ☑.



Advanced Filter - Date and Time

Records can be filtered based on their timestamp by either date, time or both combined.

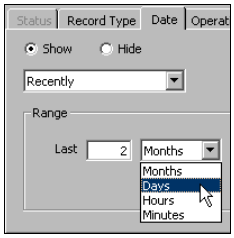
There are four possible date and time filtering modes selectable from the drop-down list:

- **Date Only** - day, month and year
- **Time Only** - hours, minutes and seconds
- **Date and Time** - combination of date and time
- **Recently** - records in the last *n* months, days, hours, minutes

Date Only means that a date field is specified, but no time. **Time Only** requires a time to be specified, but no date, so all records on all dates will be searched with the time restriction. **Date and Time** is a combination of the two, specifying a time on a given date.

Select **From** to match all records with timestamps since a specified date / time. Select **To** to match all records older than the specified date / time. Select **To** and **Both** to match records between two specified dates / times.

Select **Inclusive** to include records on the specified date(s) / time(s) in the filter. **Exclusive** does not include records on the specified date(s) / time(s).



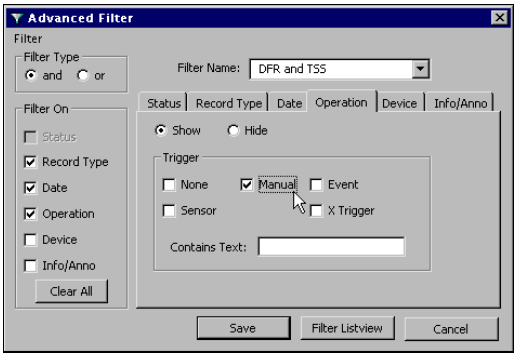
Date and Time Filter - Recently

If **Recently** is selected from the drop-down lis, the matching records will be no older than a user-defined time range from the current date. This range may be specified either in months, days, hours or minutes. From 0 to 9999 units is permitted.

Unlike any other date and time filter, **Recently** is from a variable start date, depending on what the current date is, i.e, running the filter today will list records from an older start date than running the same filter next week.

Operation Filter

Enable the **Operation** check box ☑.



Advanced Filter - Operation

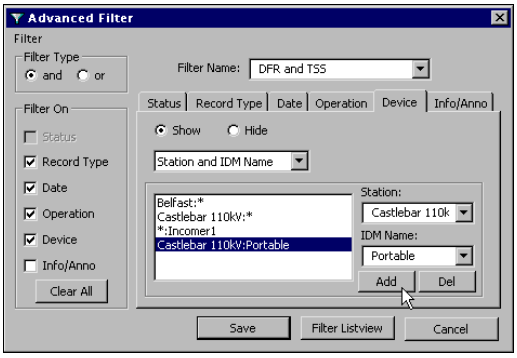
All IDM records can be filtered on any combination of the following operation (trigger) states:

- None
- Manual trigger
- Event trigger
- Sensor trigger
- X trigger

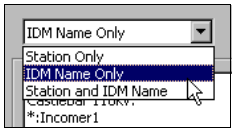
Alternatively (or additionally) specify a text string in **Contains Text**. Any records with an operation containing the string will match.

Device Filter

Enable the **Device** check box ☑.



Advanced Filter - Device



Select Filter

Records may be filtered on the basis of Station Name, IDM Name or both combined. This is selected from the drop-down list.

The Station and / or IDM Name drop-down lists contain names of the available devices.

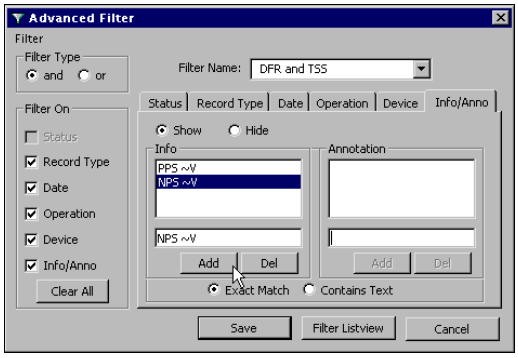
To add a device, select a Station / IDM Name from the drop-down lists and click on **Add**. Further Stations and / or IDMs can be added to the list in the same way.

Items on the list are presented in the format "Station Name:IDM Name" where "Station Name:*" means any IDM at the chosen Station and "*:IDM Name" means any Station with the chosen IDM.

To remove one or more Station / IDM Names from the list select the entry or entries then click on **Del**

Info / Annotation Filter

Enable the **Info/Anno** check box ☑.



Advanced Filter - Info/Anno

Filtering may be performed on the record info and annotation text. Either, or both may be set to one or more search text strings. To add a string to either list typed it into the box below the chosen list then click on **Add**.

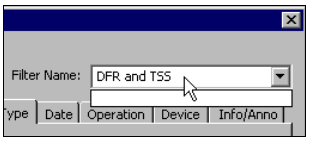
Select **Exact Match** to only include records with info or annotation that entirely match the entered strings, i.e. the whole string, will be included. Selecting **Contains Text** means that for a record to match, its info or annotation must contain the entered string but need not match exactly.

To delete items from either list select the entry or entries then click on **Del**

Saving and Using a Newly Created Filter

Filter Name

Before a filter can be used it must be given a name.

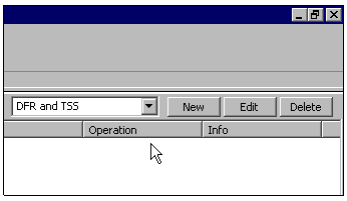


Enter Filter Name

Enter a name in the Filter Name drop-down list. This name can be up to 50 characters long.

Save

Click on **Save** to add the current filter to the filter list on the *Replay*™ *Plus* Explorer window.

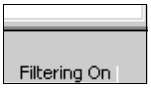


Filter Saved and Added to Filter List

Caution!
If there is already a filter with the same name as the new filter, the existing filter will automatically be replaced with the new one.

Filter Listview

Click on Filter Listview to immediately view the current filter settings in the *Replay*™ *Plus* Explorer window. Only those records which match the current filter will be visible.



Filtering On

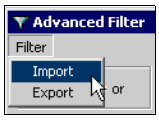
The status bar at the bottom of the *Replay*™ *Plus* Explorer window displays the message "Filtering On" while Filter Listview is active.

To cancel the current Filter Listview, click on on the toolbar to open the Advanced Filter dialog again. Disable all the check boxes ☐ in the Filter On field (or click on **Clear All**) and click on **Apply No Filter**

Note:
Filter Listview, unlike **Save**, does not permanently store the filter settings. To keep the settings of a Filter Listview it must be saved to the Filter List.

Importing and Exporting Filters

Filters may be imported or exported. This is useful, for example, to share the same filter between multiple PCs.



Import / Export

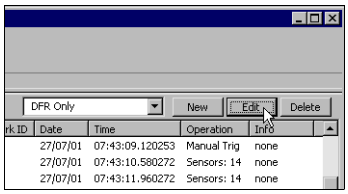
To import or export a filter, click on **Filter** on the Advanced Filter dialog and then select **Import** or **Export** from the menu.

Both importing and exporting will open a standard Windows file dialog, where the directory and file name is chosen.

All filters are given the extension ".flr".

Editing or Deleting a Filter

Editing a Filter



Edit Filter

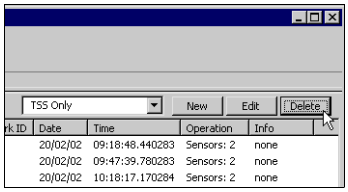
To modify an existing filter, select the filter from the filter list on the *Replay™ Plus* Explorer window (the **Filter** tab must be active) and click on **Edit**

This will open the Advanced Filter dialog.

(Alternatively click on on the toolbar to open the Advanced Filter dialog with the most recently defined filter).

Edit the filter settings and click on **Save**. The modified filter settings can be saved under the same name or a new name.

Deleting a Filter



Delete Filter

To delete an existing filter, select the filter from the filter list on the *Replay™ Plus* Explorer window (the **Filter** tab must be active) and click on **Delete**

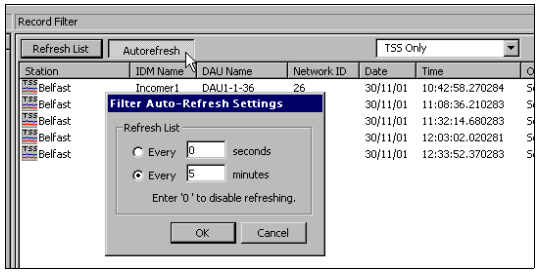
Click **Yes** to permanently delete the filter.

Filter Auto Refresh

The filter display in the *Replay™ Plus* Explorer window is refreshed automatically when a new record appears in *Replay™ Plus*.

To refresh the display manually click on **Refresh List**. This button is shown in the List View pane while the **Filter** tab is active.

Alternatively, the filter display can be set to refresh at a fixed time interval. Clicking on **Autorefresh** will open a dialog called Filter Auto-Refresh Settings.



Set Filter Auto Refresh

Refreshing can be set at 0 - 99 seconds or 0 - 99 minutes. An interval of 0 disables Autorefresh.

The button is recessed

while autorefresh is enabled. A second click of the button will disable autorefresh.

Appendices

Appendix A - Sample IDM T2 DAU Configuration Form

IDM Configuration Form (T2)

QUALITROL Hathaway

Customer: -
Job No.: -

Recorder Serial No.
Station Name: -
Job No.
Serial No.
Specification No.
LSU Included ☐
LSU Serial No.
Modem Required ☐
Model
Time Zone
Daylight Savings

DAU IP Address
DAU Subnet Mask
Gateway
LSU IP Address
Network Interface
10 baseT only
10 baseT or fibre
IDM Network ID

Time Synchronization
☐ Time Master ☐ External 1pps
☐ Time Slave ☐ Free Running ☐ Internal GPS
☐ Ext. Serial Time String ☐ Internal IRIG B

1PPS input
Fibre ☐
RS485 (TB4) ☐

	Terminal	Signal Name	Signal Type & Channel Full Scale
Analog Chan 1	IN TB 7, 1 RTN TB 7, 2		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 2	IN TB 7, 3 RTN TB 7, 4		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 3	IN TB 7, 5 RTN TB 7, 6		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 4	IN TB 7, 7 RTN TB 7, 8		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
SWC Gnd	TB 7,9		
Analog Chan 5	IN TB 7, 10 RTN TB 7, 11		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 6	IN TB 7, 12 RTN TB 7, 13		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 7	IN TB 7, 14 RTN TB 7, 15		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 8	IN TB 7, 16 RTN TB 7, 17		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
SWC Gnd	TB 7, 18		
Analog Chan 9	IN TB 6, 1 RTN TB 6, 2		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 10	IN TB 6, 3 RTN TB 6, 4		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 11	IN TB 6, 5 RTN TB 6, 6		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 12	IN TB 6, 7 RTN TB 6, 8		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
SWC Gnd	TB 6,9		
Analog Chan 13	IN TB 6, 10 RTN TB 6, 11		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 14	IN TB 6, 12 RTN TB 6, 13		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 15	IN TB 6, 14 RTN TB 6, 15		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
Analog Chan 16	IN TB 6, 16 RTN TB 6, 17		☐ DC Input ☐ I Input ☐ AC Input ☐ V Input FSD_____
SWC Gnd	TB 6, 18		

Sample IDM T2 DAU Configuration Form (Part 1)

		Terminal	Event Channel Name	
Events 1	IN	TB 5, 4		☐ Fitted ☐ 24 V ☐ 48 V ☐ 110/125 V ☐ 220/250 V
	COM	TB 5, 5		
Events 2	IN	TB 5, 6		
	COM	TB 5, 7		
Events 3	IN	TB 5, 8		
	COM	TB 5, 9		
Events 4	IN	TB 5, 10		
	COM	TB 5, 11		
SWC Gnd		TB 5, 12		
Events 5	IN	TB 5, 13		
	COM	TB 5, 14		
Events 6	IN	TB 5, 15		
	COM	TB 5, 16		
Events 7	IN	TB 5, 17		
	COM	TB 5, 18		
Events 8	IN	TB 5, 19		
	COM	TB 5, 20		
+ PP		TB 5,1		
APT		TB 5,2		
- PP		TB 5,3		
Events 9	IN	TB 4, 4		☐ Fitted ☐ 24 V ☐ 48 V ☐ 110/125 V ☐ 220/250 V
	COM	TB 4, 5		
Events 10	IN	TB 4, 6		
	COM	TB 4, 7		
Events 11	IN	TB 4, 8		
	COM	TB 4, 9		
Events 12	IN	TB 4, 10		
	COM	TB 4, 11		
SWC Gnd		TB 4, 12		
Events 13	IN	TB 4, 13		
	COM	TB 4, 14		
Events 14	IN	TB 4, 15		
	COM	TB 4, 16		
Events 15	IN	TB 4, 17		
	COM	TB 4, 18		
Events 16	IN	TB 4, 19		
	COM	TB 4, 20		
+ PP		TB 4,1		
APT		TB 4,2		
- PP		TB 4,3		
Events 17	IN	TB 3, 4		☐ Fitted ☐ 24 V ☐ 48 V ☐ 110/125 V ☐ 220/250 V
	COM	TB 3, 5		
Events 18	IN	TB 3, 6		
	COM	TB 3, 7		
Events 19	IN	TB 3, 8		
	COM	TB 3, 9		
Events 20	IN	TB 3, 10		
	COM	TB 3, 11		
SWC Gnd		TB 3, 12		
Events 21	IN	TB 3, 13		
	COM	TB 3, 14		
Events 22	IN	TB 3, 15		
	COM	TB 3, 16		
Events 23	IN	TB 3, 17		
	COM	TB 3, 18		
Events 24	IN	TB 3, 19		
	COM	TB 3, 20		
+ PP		TB 3,1		
APT		TB 3,2		
- PP		TB 3,3		
Events 25	IN	TB 2, 4		☐ Fitted ☐ 24 V ☐ 48 V ☐ 110/125 V ☐ 220/250 V
	COM	TB 2, 5		
Events 26	IN	TB 2, 6		
	COM	TB 2, 7		
Events 27	IN	TB 2, 8		
	COM	TB 2, 9		
Events 28	IN	TB 2, 10		
	COM	TB 2, 11		
SWC Gnd		TB 2, 12		
Events 29	IN	TB 2, 13		
	COM	TB 2, 14		
Events 30	IN	TB 2, 15		
	COM	TB 2, 16		
Events 31	IN	TB 2, 17		
	COM	TB 2, 18		
Events 32	IN	TB 2, 19		
	COM	TB 2, 20		
+ PP		TB 2,1		
APT		TB 2,2		
- PP		TB 2,3		

Note: For wet contact event boards apply voltage across IN & COM. For dry contact event boards connect contact across IN & COM and apply wetting voltage to +PP and -PP. APT input is not used.

Alarm Outputs

Recorder Failure	TB 1, 5	(normally closed contact)
	TB 1, 6	
Recorder Triggered	TB 1, 7	(normally open contact)
	TB 1, 8	
Earth	TB 1, 4	

Supply Voltage

Positive supply voltage	DC+	Power Supply Terminals
Negative supply voltage	DC-	" " "
or		
AC supply (live)	AC	" " "
AC supply (neutral)	AC	" " "

IRIGB ☐ AM ☐ TTL

Sample IDM T2 DAU Configuration Form (Part 2)

Appendix B - DSP Calculations

Calculated Quantities

The following quantities are calculated every cycle by the DSP processor in the IDM:

SYMBOL	DESCRIPTION
~	RMS
^	Phase Angle
Pn, where n = A, B or C	Single Phase Real Power (*3)
P3	Three Phase Real Power
Qn, where n = A, B or C	Single Phase Reactive Power (*3)
Q3	Three Phase Reactive Power
Sn, where n = A, B or C	Single Phase Apparent Power (*3)
S3	Three Phase Apparent Power
PF	Power Factor
PPS~, PPS^	Positive Phase Sequence Voltage
PPS~, PPS^	Positive Phase Sequence Current
NPS~, NPS^	Negative Phase Sequence Voltage
NPS~, NPS^	Negative Phase Sequence Current
ZPS~, ZPS^	Zero Phase Sequence Voltage
ZPS~, ZPS^	Zero Phase Sequence Current
Frq	Frequency
Hm nth, where nth is harmonic number	Harmonic
THD	Total Harmonic Distortion

Appendix C - DFR Record Lengths and Sensor OP Limits

DFR Records

A DFR record can be divided into three parts:

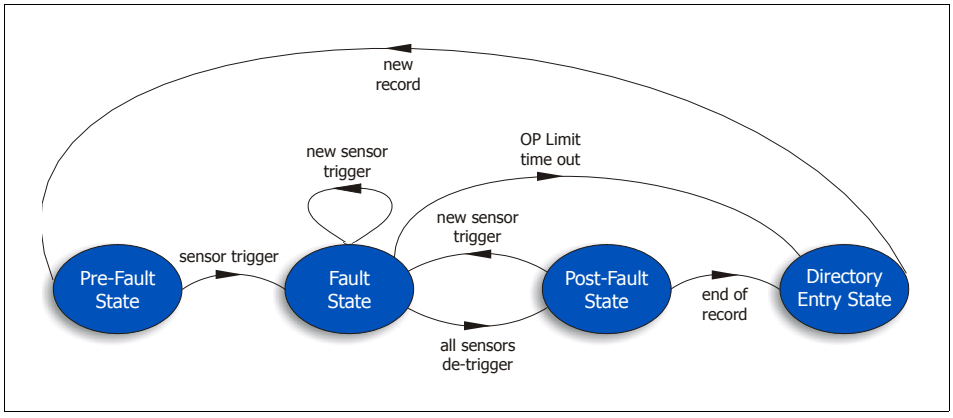
- Pre-fault section
- Fault section
- Post-fault section

The DFR function records continuously and in the absence of any sensor operations remains in the pre-fault state, filling the pre-trigger circular buffer. The DFR function can be triggered either by the operation of one of it's own sensors or by the receipt of a cross-trigger message from another DAU.

When triggered the DAU now moves to the fault state where it begins to fill the post-trigger buffer and remains here while any of the sensors are in the active state. When all sensors return to the non-triggered state the DFR function then moves to the post-fault state where it continues to record for the duration of the post-fault configuration setting storing data in the post-trigger buffer. When complete, the DFR function moves briefly to the directory entry state where it makes an entry in the DFR directory then returns to the pre-fault state where it begins to fill the pre-fault buffer for a new record.

However, should a sensor remain permanently in the triggered state the sensor is automatically disabled after its OP Limit time at which point the DFR function moves straight from the fault state to the directory entry state without passing through the post fault state.

While the DFR is in the post-fault state, if a new sensor operation occurs, it will return to the fault state and remain in this state until all sensors return to the non-triggered state or reach their OP Limit time.



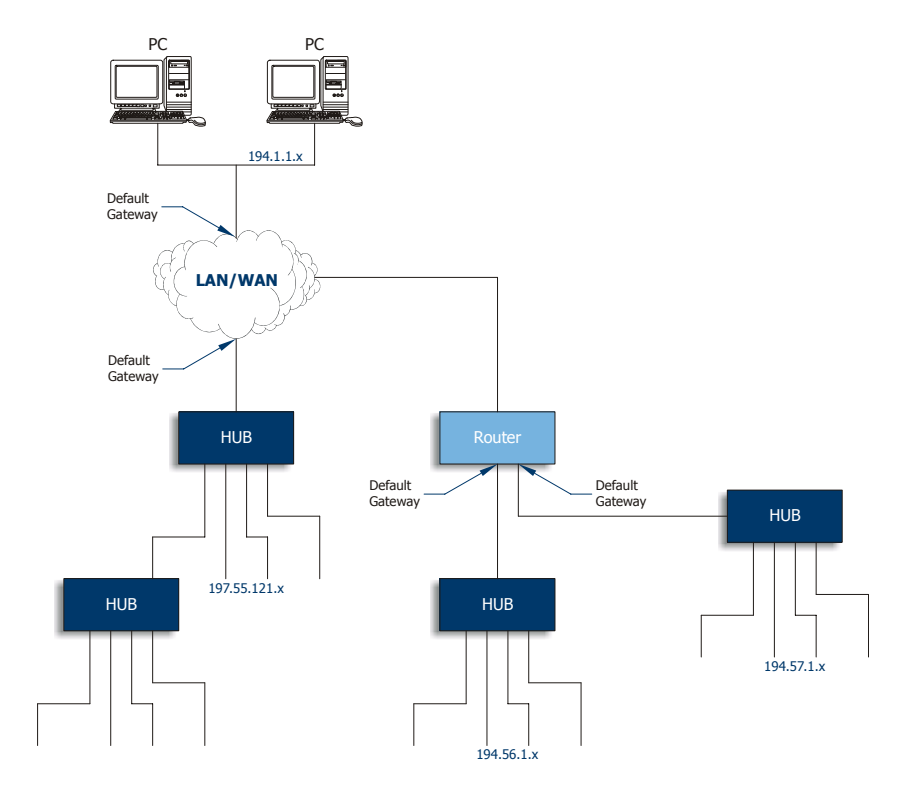
DFR State Transition Diagram

Appendix D - About IP Addresses

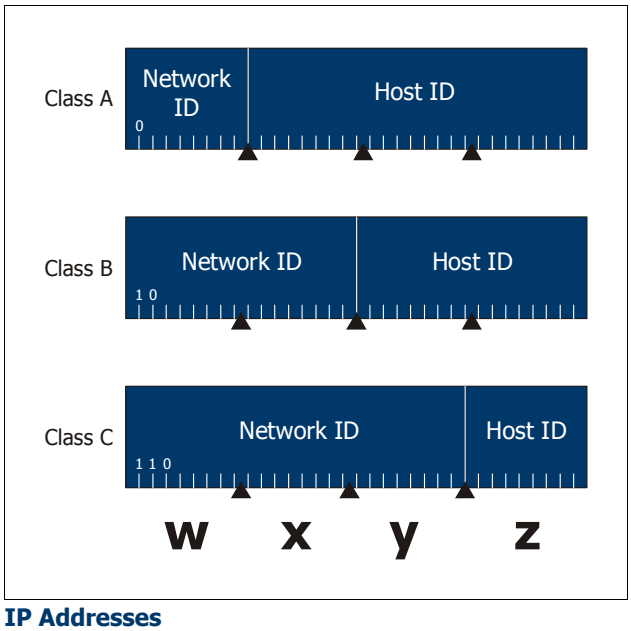
Introduction

IP addresses are used to uniquely identify devices connected to a TCP/IP network and they consist of four bytes normally written as four decimal numbers separated by a period (e.g. 194.9.165.22). There are three different classes of IP address, Class A, Class B and Class C and each address is divided into two parts, the Net ID and the Host ID. The Net ID uniquely identifies the network segment and the Host ID uniquely identifies a device or host connected to that network segment.

Class C addresses are those where the first octet is equal to or greater than 192, Class B addresses are those where the first octet is equal to or greater than 128 and less than 192 and Class A addresses are those where the first octet is less than 128.



Typical Network Topologies



IP Addresses

In addition to the IP address the TCP/IP protocol uses the Subnet Mask to determine if a device is located on the local or remote network segment.

The default subnet mask for a Class A IP Address is 255.0.0.0, for a Class B address is 255.255.0.0 and for a class C Address is 255.255.255.0.

For a device on one network segment to communicate with a device on a remote network segment it must know the IP Address of the default gateway.

All network traffic from one network segment to another will pass through the default gateway.

This default gateway IP Address must form part of the configuration of all devices that wish to communicate with other devices on remote network segments.

Some typical network topologies are shown on the previous page.

In Summary

- All devices on the same network segment must have unique IP Addresses
- The NetID of the IP Addresses of all devices on one network segment must be identical
- An incorrect subnet mask may result in devices being unable to communicate on the network
- A default gateway must be added to the configuration to communicate with devices on a different network segment

Note:
If in doubt contact your network administrator for details of the correct IP Address, subnet mask and default gateway.

Appendix E - IDM Hardware Overview and Jumper Settings

IDM T2 DAU Hardware Overview

A standard IDM T2 DAU contains the following PCBs:

- A CPU board (PCB **12-8292** - Mk I) (PCB **12-8320** - Mk II)
- An Analog board (PCB **12-8293** - Mk I)
- A Front Panel board (PCB **12-8294**)

This hardware is specifically designed to facilitate the upgrade of DFR 0, DFR I, DFR II or DFR IIB Fault Recorders.

The CPU Board

The major component parts of the CPU board (Qualitrol Hathaway PCB **12-8292** / **12-8320**) comprise:

- An Intel 386EX embedded microprocessor running the VXworks real-time operating system
- An Analog Devices Digital Signal Processor for mathematical computations
- A Xilinix FPGA for glue logic
- Intel 1MByte flash memory for non-volatile program storage
- 16MByte of DRAM for volatile data storage

Other peripheral devices include:

- A SMC91C96 chip for ethernet RJ45 or fibre connection
- RS232 and RS485 line drivers / receivers
- Dallas Real time clock chip
- Optional Oncore GPS module or IRIG-B and 1pps support via RS485 / fibre or opto-coupler

CPU reset and auxiliary reset push switches are accessible at the front of the board.

Connectors allow the use of ribbon cables to interconnect the boards and the DFR chassis to complete the upgrade.

The CPU board plugs into the DFR chassis backplane.

The Analog Board

The major component parts of the Analog board (Qualitrol Hathaway PCB **12-8293**) comprise:

- An Analog Devices AD977 16-bit serial ADC and associated 16-channel multiplexer
- 16 independent signal conditioning channels comprising sample / hold and operational amplifiers with associated scaling resistors and filtering capacitors

Analog and digital event signals are taken from the DFR Fault Recorders existing signal conditioners. Interface connectors allow the use of ribbon cables to interconnect the boards and the DFR chassis to complete the upgrade.

The Analog board plugs into the DFR chassis backplane.

The Front Panel Board

The major component parts of the Front Panel board (Qualitrol Hathaway PCB **12-8294**) comprise:

- A 2 row, 16 character LCD
- Ten status LEDs

Keypad, RS232 and CPU board interface connectors are also provided.

IDM T2 Mk I CPU Board (12-8292) Jumpers

FUNCTION	OPTIONS	RANGE/ JUMPER SETTING
COM PORT #2	RS485 P17	J6 A J24 / J25 A
	RS232 P16	J6 B J24 / J25 A
	GPS P21	J24 / J25 B
EVENT POLARITY	Active low	J1 in*
	Active high	J1 out
BOOT BLOCK WRITE PROTECT	Not protected	J2 out
	Protected	J2 in*
RAM SIZE	4Mb	J3 out
	16Mb	J3 in*
LOOPBACK	Enabled	J4 A
	Disabled	J4 B*
SEQ	Enabled	J5 A*
	SEQ and jabber disabled	J5 B
	Disabled	J5 C
FLASH SELECT	On board U12	J13 A*
	External P6	J13 B
U12 FLASH SIZE	28F400 (A19)	J14 A
	28F800 (A20)	J14 B*
U15 FLASH SIZE	28F400 (A19)	J15 A
	28F800 (A20)	J15 B*
P17 RS485 COMMS	120R terminated	J17 A
	No termination	J17 B
P19 1pps VIA RS485	120R terminated	J20 A
	No termination	J20 B
FIBRE OPTIC ETHERNET TX	A -	J22 A
	B -	J22 B*
FIBRE OPTIC ETHERNET RX	A -	J23 A*
	B -	J23 B
LINE SYNCH	50 - 60Hz	J200 A
	Line synch	J200 B
IRIG-B SERIAL O/P TO uP VIA J24 / 25B	Enabled	J205 / J206 fitted
	Disabled	J205 / J206 parked

***factory defaults, not customer specific**

IDM T2 Mk II CPU Board (12-8320) Jumpers

FUNCTION	OPTIONS	RANGE/ JUMPER SETTING
COM PORT #2	RS485 P17	J6 A J24 / J25 A
	RS232 P16	J6 B J24 / J25 A
	GPS P21	J24 / J25 B
EVENT POLARITY	Active low	J1 in*
	Active high	J1 out
BOOT BLOCK WRITE PROTECT	Not protected	J2 out
	Protected	J2 in*
DATA FLASH WRITE PROTECT	Protected	J29 in
	Not protected	J29 out*
LOOPBACK	Enabled	J4 A
	Disabled	J4 B*
SEQ	Enabled	J5 A*
	SEQ and jabber disabled	J5 B
	Disabled	J5 C
FLASH SELECT	On board U12	J27 A*
	External P6	J27 B
1pps SELECT	1pps via GPS / IRIG-B	J26 A
	Internal Xtal 1pps	J26 B
ALARM TYPE	A - Fault alarm	J201 A
	B - Service alarm	J201 B
	C - Operate alarm	J201 C*

P17 RS485 COMMS	120R terminated	J17 A
	No termination	J17 B
P19 1pps VIA RS485	120R terminated	J20 A
	No termination	J20 B
FIBRE OPTIC ETHERNET TX	A -	J22 A
	B -	J22 B*
FIBRE OPTIC ETHERNET RX	A -	J23 A*
	B -	J23 B
LINE SYNCH	50 - 60Hz	J200 A
	Line synch	J200 B
IRIG-B SERIAL O/P TO uP VIA J24 / 25B	Enabled	J205 / J206 fitted
	Disabled	J205 / J206 parked

***factory defaults, not customer specific**

Appendix F - Generic IDM Calibration Procedure

Step 1 - Equipment Checklist

The following equipment is required for IDM calibration:

- 4-digit DVM
- AC injection test set
- PC running IDMCal software, version 2.12 or better

Caution!
Dangerous voltages may be present during testing. Anti-static procedures must be followed.

Step 2 - Initial Tests

To calibrate an IDM VT/CT board, the following information is required:

- Number of Voltage channels and their analog channel numbers
- Selected Voltage range(s)
- Number of Current channels and their analog channel numbers
- Selected Current range(s)

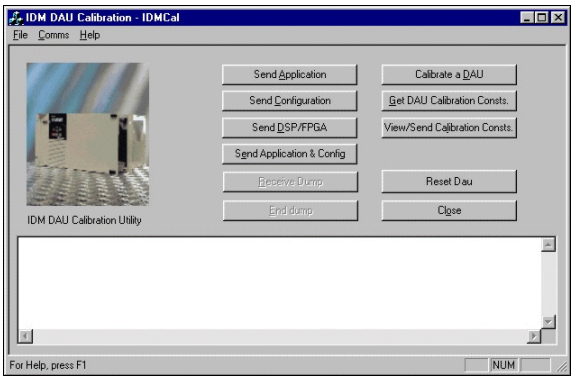
The IDM is calibrated to the customers requirement with the CPU board, Analog board, Event board and VT/CT board 1 and 2 in place. All jumpers on the VT/CT and Analog boards will have been configured as per customer requirements.

Step 3 - Calibration Configuration

Run the IDMCal program. Click on **Calibrate a DAU** from the startup screen. The Select Groups, then FSD's and Units dialog allows the analog channel configuration of the DAU to be set.

Click on **Load** to select a pre-formatted setup to be loaded. This is useful for calibrating multiple IDM for the same configuration.

If no suitable setup is available fill in the DAU channel format configuration data on the dialog. The numbers on the left hand side of the columns, headed Approx FSD and Units, are the analog channel numbers.



IDMCal Startup Screen

For each analog channel available on the DAU complete the FSD and Units fields. Each analog channel can be assigned a Group Number (1 - 17), where analog channels of the same FSD and units may be assigned the same Group Number. All channels given the same Group Number will contain the same FSD and Unit information automatically.

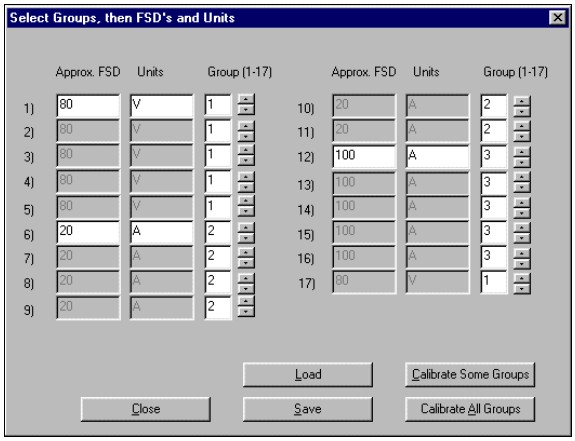
Example DAU configuration as follows:

- Five 80V voltage channels (1 - 5)
- Six 20A current channels (6 - 11)
- Five 100A current channels (12 -16)

Select Group Number 1, Channel 1, type in the channel full scale FSD and its units, i.e, 80 and V respectively. Now all channels 1 - 17 in Group Number 1 contain this same information.

For the 20A current channels 6 - 11, go to the analog channel numbers 6 , 7, 8, 9, 10, 11 and change the corresponding Group Number to 2. Now go to channel 6 and enter the FSD value as 20 and the Units value as A. Channels 7, 8, 9, 10 and 11 are automatically updated with this information as they are in the same Group (2).

Similarly for the 100A current channels 12 - 16. Go to the analog channel numbers 12 , 13, 14, 15, 16 and change the corresponding Group Number to 3. Now go to channel 12 and enter the FSD value as 100 and the Units value as A. Channels 13, 14, 15 and 16 are automatically updated with this information as they are in the same Group (3).



Example Analog Channel Configuration

Unavailable analog channels do not need to be configured. Any unused channels can be removed by deleting the group number given to these channels.

Note:
The Group Number allocation is free form. Assign a different group number to each group of similar analog channels. However the 'Wizard' calibrates Groups of channels in ascending Group Numbers and not analog channel numbers.

Click on **Save** to save this configuration to disk.

Next the DAU can be calibrated either by **Calibrate Some Groups** which allows selected group or groups to be calibrated or **Calibrate All Groups** which calibrates all groups.

An accurate AC Voltage and Current source will be required to calibrate the DAU. If an accurate three phase AC test set is not available it is possible to use a single phase test set and connect all channels in a Group together to the same source, with voltage channels connected in parallel and currents connected in series.

A 4-digit DVM should be used to measure the volts and amps injected to provide accurate calibration. Also the injected signals should be in the region of 80% of the configured FSD where possible. Polarity of all connections should be checked.

Step 4 - Zero Offset Calibration

Once the calibration profile has been setup for the DAU then all channels to be calibrated must have their input terminals shorted together to allow the Zero Offset calibration process to be completed.

The first IDMCal calibration process carries out this test first for all the selected channels in a Group.

Note that each selected Group is processed in turn, with Zero Offset calibration followed by FSD calibration then on to the next Group until all Group(s) are calibrated.

Click on **Next**. This fixes the zero offsets.

Step 5 - Full Scale Calibration

Once a Group has been calibrated for Zero Offset, FSD calibration is now required. Connect the channels in the Group as required to the relevant injection source and set the injection levels as required (recommended 80% of FSD) for the configured input range.

With the injection source On, measure using a 4-digit DVM (capable of Real RMS measurement for AC channels) the injected level and type this DVM reading exactly into the FSD text box on the dialog. Ensure the correct RMS / DC selection is made and click on **Next**. Repeat this process for all channels and groups required.

Step 6 - Finish Calibration

Once all Groups have been calibrated the Finish option is displayed. Click on **Finish** and IDMCal will retrieve from the IDM the current calibration values. These values are displayed in table form with a Zero Offset value and a FSD value listed for each of the possible seventeen channels. Only the channels calibrated need to be checked.

Please note the calibration values in the table below:

CHANNEL NUMBER	CALIBRATED ZERO OFFSET	ZERO OFFSET LIMIT BIT LEVELS	CALIBRATED FSD VALUE	FSD VALUE LIMIT %
1		100		20
2		100		20
3		100		20
4		100		20
5		100		20
6		100		20
7		100		20
8		100		20
9		100		20
10		100		20

11		100		20
12		100		20
13		100		20
14		100		20
15		100		20
16		100		20
17		100		20

Click on **Save** to save the calibration results to file. The file name given to the calibration results is the serial number of the chassis. All calibration files must be stored safely to a common storage area which should in turn be backed-up to a remote archive.

Appendix G - IDM Configuration CD-ROM

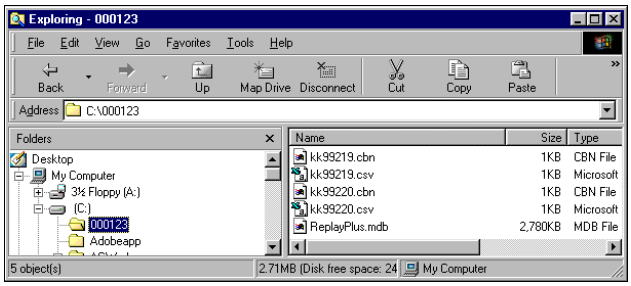
Introduction

Dispatched with every IDM order is a CD-ROM labelled **IDM Configuration Database**. This CD holds calibration files and the original factory installed configuration used during testing of the units.

A typical Configuration CD will have the following contents.

- kk*.cbn
- kk*.csv
- ReplayPlus.mdb

This is shown below.



IDM Configuration CD Contents

The six digit number, **000123** in this example, is the internal Job Number used by Qualitrol Hathaway during the manufacture of the IDM units.

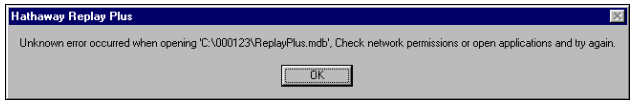
Copy from CD / Read-Only Attribute

The ReplayPlus.mdb file is a copy of the *Replay™ Plus* database used whilst testing the IDM units.

This database may be copied from the Configuration CD to the hard drive of a PC which is to run *Replay™ Plus*.

Note:
The database file copied from a CD will have a read-only attribute.

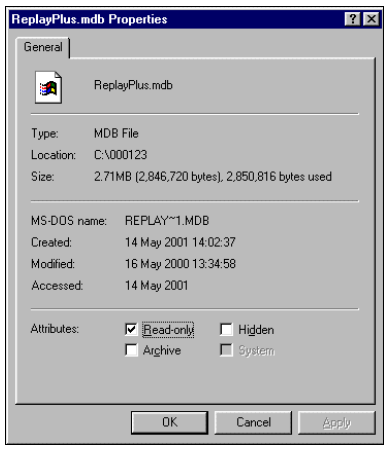
If *Replay™ Plus* tries to operate with a database with a read-only attribute an error message is displayed.


Hathaway Replay Plus
Unknown error occurred when opening 'C:\000123\ReplayPlus.mdb', Check network permissions or open applications and try again.
OK

Read-Only Error

To remove this read-only attribute:

1. Using Windows Explorer right-click on **ReplayPlus.mdb** and select **Properties**



ReplayPlus.mdb Properties

2. Un-check the **Read-only** box.
3. Click on **Apply**

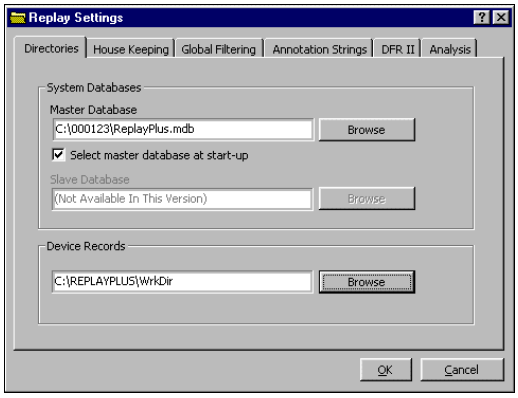
The read-only attribute has been removed. *Replay™ Plus* will now successfully operate with this database file.

Replacing Installed Database

The database file on the Configuration CD may be used to replace the database installed by *Replay™ Plus*.

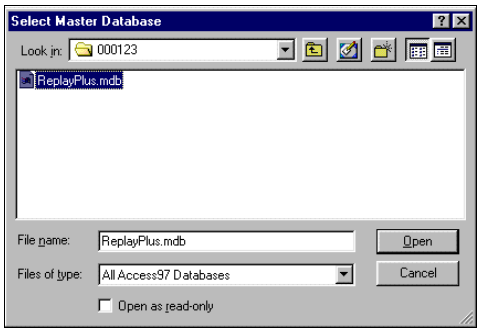
To replace the installed database:

1. Copy the database file from the Configuration CD to the hard drive of the selected PC and remove the read-only attributes as outlined above.
2. Start *Replay™ Plus*. From the **Edit** menu select **Settings**
3. Click on **Browse** beside the Master Database field.



Replay Settings Dialog

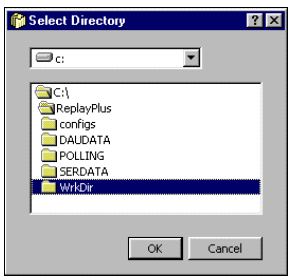
4. The following dialog is displayed allowing the user to locate the required database file.



Selecting the Master Database

5. Highlight the selected database file (the database file copied from the Configuration CD) and click on **Open**

6. Click the **Browse** button beside the **Device Records** field and specify the folder into which records are to be stored.



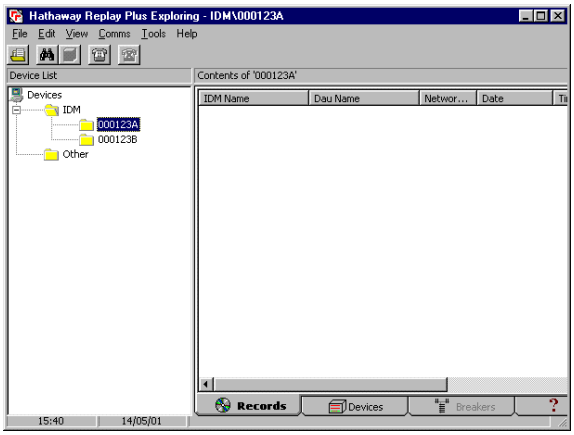
Selecting Device Records Directory

7. Click on **OK** and *Replay*™ *Plus* is ready to operate with this database.

Generating IDM Default Configurations

With *Replay*™ *Plus* setup to use the default database from the Configuration CD, it is possible to generate default configurations for IDM DAUs.

The database for 000123 in this example contains two IDM DAUs.



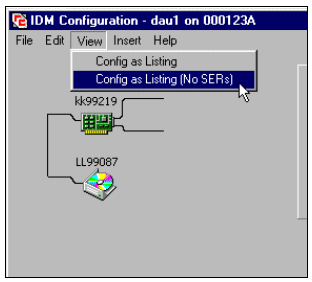
Database for 000123 Containing Two IDM DAUs

To create a default configuration

1. In the List View on the right select the **Devices** tab

at the bottom.

2. Right-click on the relevant DAU in the List View and select **Configure IDM**



Creating a Default Configuration

3. Select **Config as Listing (No SERs)** from the **View** menu. This will show the configuration of the DAU as a text file in WordPad.

4. Using Windows Explorer, locate the file **RAWCONFIG01.cfg** (normally located in the same folder as the *Replay*™ *Plus* application).

5. Copy this file to another folder and rename it (in this example **Default_kk99219.cfg** is suggested).

6. Close WordPad.

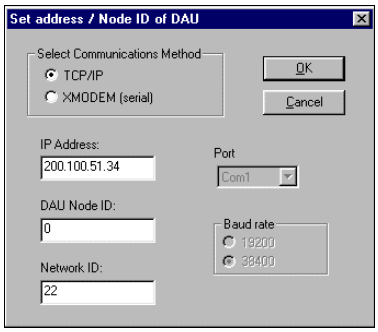
Sending IDM Default Configurations

Should it become necessary, the IDMCal program may be used to send a default configuration file back to the IDM DAU. To do this:

1. Create a default configuration file for the DAU as outlined previously

2. Run IDMCal software.

3. Select **Set DAU Address/Comport** from the **Comms** menu specify and specify the appropriate information to communicate with the DAU.

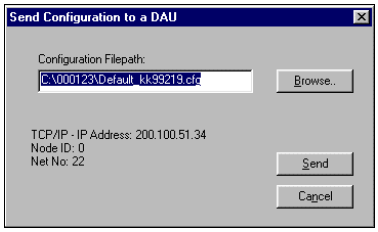


Selecting Communication Information

4. Click **OK**

5. Click on **Send Configuration** from the IDMCal startup screen.

6. On the dialog shown, click on **Browse..** to locate the required .cfg file.



Selecting Configuration File

7. Click on **Send** to send the configuration file to the DAU.

8. Close IDMCal.

About IDM Calibration Files

The **kk*.cbn** and **kk*.csv** are calibration files for the individual IDM DAUs and are linked to a specific DAU through its serial number.

For example, kk99219.csv and kk99219.cbn are for a DAU whose serial number is kk99219.

There are two types of calibration file, cbn and csv.

- The csv files (comma separated variables) provide details of the DAU calibration in spreadsheet format for ease of reading

These files are not needed or used by the DAU or by *Replay™ Plus* and are provided to allow viewing of a DAUs original calibration.

- The cbn file (calibration binary file) is the actual calibration of the DAU

A copy of this file is stored in non-volatile flash memory of the DAU and serves as its calibration in lieu of potentiometers, etc.

Sending Calibration Files

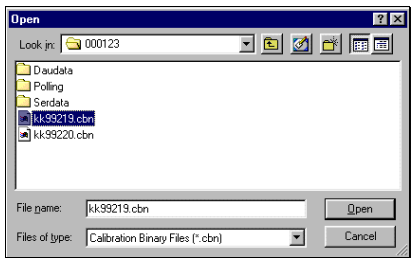
Should it become necessary, the IDMCal program may be used to send a cbn file back to a DAU. To do this:

1. Identify the serial number of the DAU. Identify the required cbn file on the Configuration CD and copy this file from the CD to a temporary folder on a PC running IDMCal.

2. Run IDMCal software.

3. Select **Set DAU Address/Comport** from the **Comms** menu specify and specify the appropriate information to communicate with the DAU.

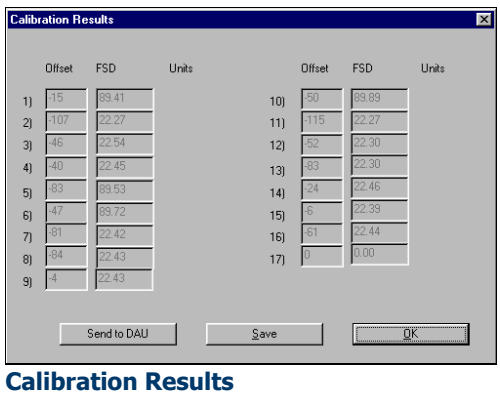
4. Click on **View/Send Calibration Consts.** from the IDMCal startup screen.



Selecting Calibration File

5. On the dialog shown, locate the required cbn file and highlight this cbn file by clicking on it.

6. Click on **Open** and the calibration binary file will be displayed.



Calibration Results

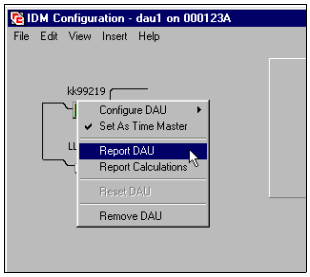
7. Click the **Send to DAU** button to send the cbn file to the DAU.

8. Close IDMCal and run *Replay™ Plus*.

9. In the List View on the right select the **Devices** tab

at the bottom.

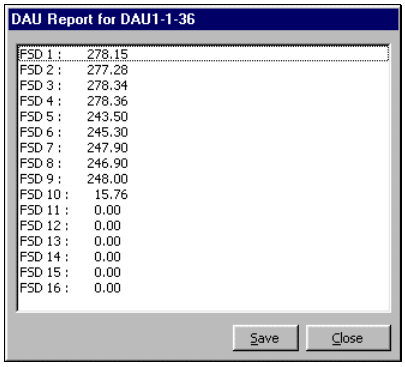
10. Right-click on the relevant DAU in the List View and select **Configure IDM**



Selecting Report DAU

11. Right-click on the relevant DAU icon and select **Report DAU**

12. A DAU Report dialog will be displayed which shows calibration details of the DAU.



DAU Calibration Details

13. Click on **Save**

14. Click on **Save and Send** in the IDM Configuration dialog and calibration of the DAU is fully restored.

Database Version Number

The database used by *Replay™ Plus* contains a version number and this version number is checked and validated by *Replay™ Plus*.

As new versions of *Replay™ Plus* are made available, the version of the database may increase as additional features and enhancements are added.

Thus, when a Configuration CD is used it is possible that a database version number discrepancy may be reported.

If this occurs, then two scenarios are possible:

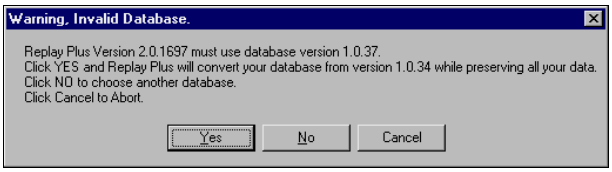
- The database on the Configuration CD is **older** than that required by *Replay™ Plus*

or

- The database on the Configuration CD is **newer** than that required by *Replay™ Plus*

The Configuration CD Contains an Older Database Version

If the Configuration CD contains an older database version *Replay™ Plus* will report this with a typical dialog as shown.


Warning, Invalid Database.
Replay Plus Version 2.0.1697 must use database version 1.0.37.
Click YES and Replay Plus will convert your database from version 1.0.34 while preserving all your data.
Click NO to choose another database.
Click Cancel to Abort.
Yes
No
Cancel

Older Database Version Discrepancy

The information in this dialog indicates the database version required by *Replay™ Plus* is a higher version than that reported by the selected database file. To proceed:

1. Click on **Yes**

2. *Replay™ Plus* will then automatically update the database file.

Update Database

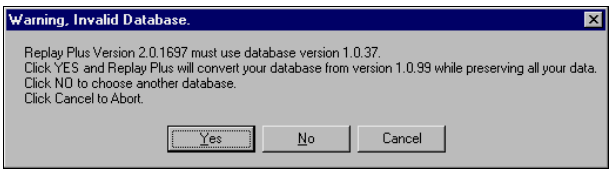
3. Click the **OK** button on all dialogs that follow, as they report the database updating progress.

Update Database

When all database updates have been completed, *Replay™ Plus* will run as normal.

The Configuration CD Contains a Newer Database Version

If the Configuration CD contains a newer database version *Replay™ Plus* will report this with a typical dialog as shown.

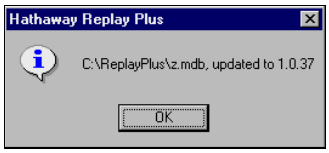

Warning, Invalid Database.
Replay Plus Version 2.0.1697 must use database version 1.0.37.
Click YES and Replay Plus will convert your database from version 1.0.99 while preserving all your data.
Click NO to choose another database.
Click Cancel to Abort.
Yes
No
Cancel

Newer Database Version Discrepancy

The information in this dialog indicates the database version required by *Replay™ Plus* is a lower version than that reported by the selected database file. To proceed:

1. Click on **Yes**

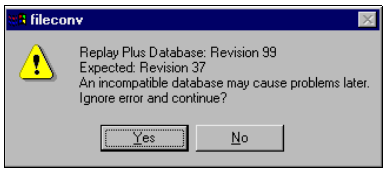
2. *Replay™ Plus* will then force the database to *temporarily* have the correct database version number.



Update Database Temporarily

3. Click on **OK** on the resulting dialog to allow *Replay™ Plus* to launch.

4. When *Replay™ Plus* is running the following dialog will appear to indicate that the database is not the correct version. Click on **Yes** to continue.



Database Incompatibility

Caution!
It is strongly recommended that if such an incompatibility between database versions and *Replay™ Plus* versions exists, the user should not proceed with the database upgrade if at all possible. Its use must be strictly limited to emergency situations, for example, to facilitate the recovery of a faulty IDM DAU unit, or when all other options have been exhausted.
The correct procedure is to update the version of *Replay™ Plus*.

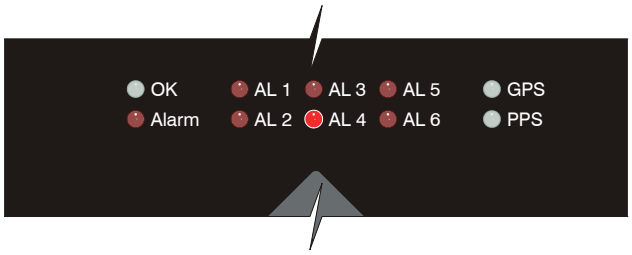
Appendix H - IDM DAU Recovery

Introduction

If an IDM DAU should appear to be faulty, i.e, there is no display shown on the LCD and there are several LEDs on, then the procedure outlined in this appendix may be used to try and recover the DAU.

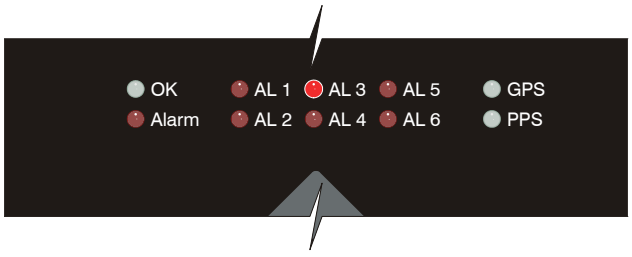
The types of faults are as follows:

AL4 On



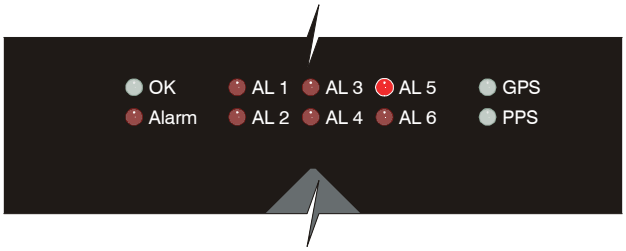
This pattern means **corrupt application**.

AL3 On



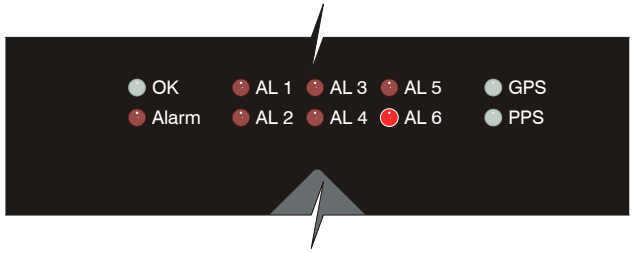
This pattern means **corrupt DSP/FPGA**.

AL5 On



This pattern means **corrupt configuration**.

AL6 On



This pattern means **corrupts checksums**.

Note:
Normally, corrupt checksums will be shown with one of the others, but it is possible for any combination of these red LEDs to be shown.

Files Required for DAU Recovery

If the DAU has detected a corruption, then the following files are required:

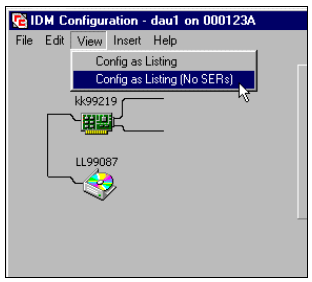
- Configuration
- DSP/FPGA
- Application

Configuration File

To generate a configuration file, run *Replay™ Plus*.

1. In the List View on the right select the **Devices** tab

at the bottom.



Creating a Default Configuration

2. Right-click on the relevant DAU in the List View and select **Configure IDM**

3. Select **Config as Listing (No SERs)** from the **View** menu.

This will show the configuration of the DAU as a text file in WordPad.

4. Using Windows Explorer, locate the file **RAWCONFIG01.cfg** (normally located in the same folder as the *Replay™ Plus* application and approximately 46k in size) and copy it to a temporary folder. This is the binary configuration file that can be sent to a DAU.

5. Close *Replay™ Plus*.

DSP/FPGA File

This file is available on the *Replay™ Plus* CD or from Qualitrol Hathaway.

A typical file name, where **319** represents the **FPGA** version and **1006** represents the **DSP** version, would be as follows:

- 319d1006_59c7.dat "d" - All 10 channel T1 DAUs
- 319h1006_c40b.dat "h" - All 16 channel T2/T3/T5 DAUs
- 319x1016_f0f0.dat "x" - 16 channel T2 DAUs that use Line Sync

Note:
It is critical for correct operation of the DAU that the correct file DSP/FPGA file is selected.

Application File

This file is available on the *Replay™ Plus* CD or from Qualitrol Hathaway.

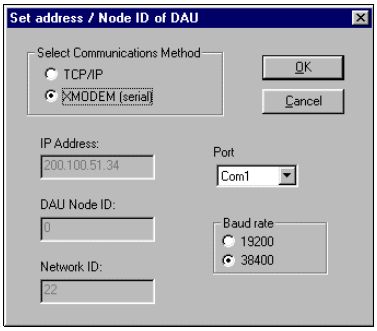
A typical file name, where **x**, **y** and **z** are the application version numbers, would be as follows:

- vx080201_x-y-z.bin - For RJ45 twisted pair ethernet only
- vxAUI080201_x-y-z.bin - For fibre optic ethernet only

DAU Recovery Procedure

1. Connect the DAU to a PC running IDMCal using the correct serial cable (Qualitrol Hathaway cable **16-1949**). Refer to Chapter 2, Connecting Peripherals, for more information on this cable. Connect this cable between the pc COM port and COM1 on the DAU.

2. Run IDMCal. Select **Set DAU Address/Comport** from the **Comms** menu.



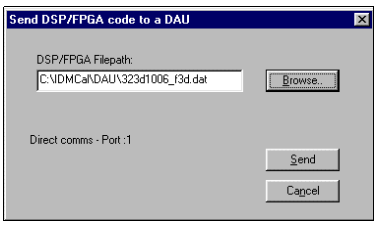
Selecting Communications Method

3. Select Communications Method to **XMODEM (serial)** and the Port to the COM port on the PC that is connected to the DAU. The Baud rate shall be set to **38400**.

4. Click on **OK**

To Send DSP/FPGA

5. Click on **Send DSP/FPGA** from the IDMCal startup screen.



Sending DSP/FPGA File

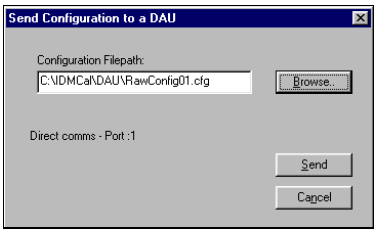
6. On the dialog shown click on **Browse..** and locate the required DSP/FPGA file.

7. When the correct file has been selected, click on **Send**. As the file is being transferred, the LEDs on the DAU will flash.

8. When the file has been completely transferred, reset the DAU manually using <Reset> on the keypad. The DAU will attempt to run, and if there are still corruption errors detected, the DAU will illuminate appropriate LEDs as described previously.

To Send Configuration

9. Click on **Send Configuration** from the IDMCal startup screen.



Sending Configuration File

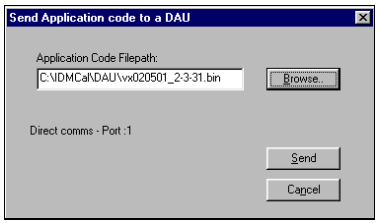
10. On the dialog shown click on **Browse..** and locate the required configuration file.

11. When the correct file has been selected, click on **Send**. As the file is being transferred, the LEDs on the DAU will flash.

12. When the file has been completely transferred, reset the DAU manually using <Reset> on the keypad. The DAU will attempt to run, and if there are still corruption errors detected, the DAU will illuminate appropriate LEDs as described previously.

To Send Application

13. Click **Send Application** from the IDMCal startup screen.



Sending Application File

14. On the dialog shown click on **Browse..** and locate the required configuration file.

15. When the correct file has been selected, click on **Send**. As the file is being transferred, the LEDs on the DAU will flash.

16. When the file has been completely transferred, reset the DAU manually using <Reset> on the keypad. The DAU will attempt to run, and if there are still corruption errors detected, the DAU will illuminate appropriate LEDs as described previously.

Boot Loader Mode

Boot Loader mode allows new binary files (Configuration, DSP/FPGA or Application) to be sent to the IDM DAU via its COM1 serial port. The Boot Loader will automatically install such new files to the IDM DAU.

When in Boot Loader mode, the IDM DAU Recovery procedure outlined in the previous section may be used.

If required, the IDM DAU may be put into Boot Loader mode manually. On the IDM CPU board there are two small push button switches which should be operated as described below to force the IDM DAU into Boot Loader mode:

1. Press the **Reset** and **Boot Loader** buttons together.

2. Release the **Reset** button first then the **Boot Loader** button two seconds later.

3. The red LEDs **AL1 - AL6**, the red **Alarm** LED and the green **OK** LED are illuminated and the Boot Loader is active.

Note:
On IDM T1 and T4 DAUs the **Reset** button is on the left and the **Boot Loader** button is on the right.
On IDM T2, T3 and T5 DAUs the **Reset** button is on the bottom and the **Boot Loader** button on the top.

Boot Loader mode communicates through the front panel **RS232** port at 38400 baud. The The red LEDs **AL1 - AL6**, the red **Alarm** LED and the green **OK** LEDs flash when data is being transferred.

The Boot Loader must be restarted to download each new data file.

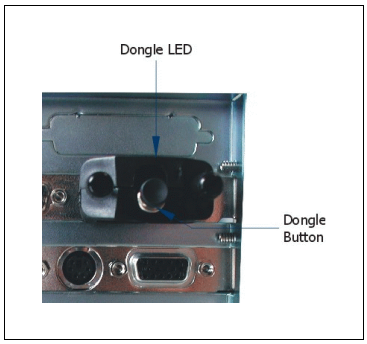
Appendix I - Upgrading LSU Code

LSU Upgrade Procedure

If an upgrade of the Local Storage Unit code is necessary:

1. Insert the upgrade 3.5” diskette (available from Qualitrol Hathaway) in the floppy drive at the rear of the LSU.

Caution!
The LSU should not be powered down at any time during or after this process.



LSU Dongle (COM2)

2. Press and hold in the dongle button until the dongle LED stops flashing and the disk drive begins to run.

3. The upgrade will automatically take place and the LSU will resume normal operations. This exercise takes approximately 20 minutes.

4. When the dongle LED begins flashing and no floppy disk drive activity is evident, the 3.5” diskette should be removed.